A Textbook of
HYGIENE FOR TEACHERS
in Africa

W. NORMAN TAYLOR

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TEXTBOOK OF HYGIENE FOR TEACHERS IN AFRICA

To all African teachers who prefer knowledge and science to superstition and credulity, who prefer activity to apathy, and who, above all, earnestly want to help make the next generation a healthier and happier one.

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much muddled thinking. These two chapters are therefore written in rather more detail.

The chapter on reproduction has been dealt with more fully than might ordinarily be considered necessary in a book of this sort, but it is in my experience a field in which there is more confusion and a greater clash of cultural patterns than in any other branch of hygiene. The Victorian concept of the "purity of innocence" seems still to be current in many of the secondary schools for Africans, and young people arrive at the threshold of maturity with nothing to guide them except the patterns handed on from tribal days. These are often in many ways at variance with what they have been led to believe are the European patterns, and may give rise to serious conflicts, not only in their consciences but also overtly with the society in which they have to live. In this connection, ideas gleaned from books, "comics" and films may give the impression that there is a sharp difference between European practice and precept. In this book, therefore, I have attempted to set down as simply and concisely as possible the plain facts and the modern, educated man's attitude towards them.

The second part of the book deals with an aspect of school hygiene which is virtually unknown territory as far as the majority of African teachers are concerned, and is my chief excuse for writing this book at all. In European-run schools responsibility for the actual *health* of the pupils is too often left entirely to the school medical officer. In African schools, at the other extreme, it all goes by default. In this part of the book the attempt is made to show the teacher that this responsibility must be the teacher's, and that where there is no organized medical service to help and advise him, the teacher's responsibilities and duties are so much the greater.

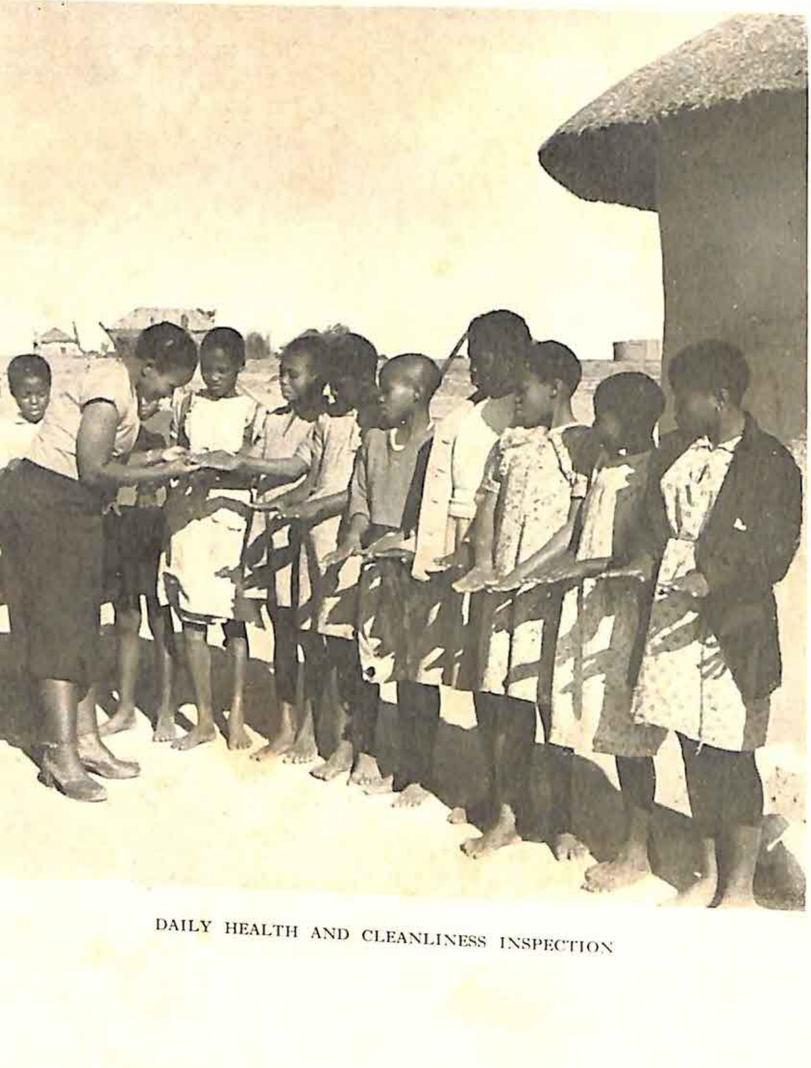
There may be some critics who say that in the second part of the book there is too much description of disease, its recognition and treatment. To such critics I would reply that one section of the population for whom this book is written has usually not much in the way of medical facilities readily available, nor, all too often, the money with which to avail themselves of what there is. Anyone who has worked among African schools will have seen a number of tragedies, blindness, deformity and even death, which could have been prevented by a glimmer of intelligent understanding of the implications. Health education is all very well, but there is with us at the same time an appalling burden of sickness to contend with.

In the book will be found a good deal of repetition. No attempt has been made to avoid this if by so doing a gap has been left in the completeness of any particular section.

To the medical reader, if there should be one, I may appear to have been too dogmatic in some particulars. This is admitted, but, in my experience in teaching teachers, it is preferable to give definite statements, not the "some-people-say-this-and-some-people-say-that" kind of advice.

In conclusion, I should like to thank the many willing friends who have helped me with their suggestions and criticisms. In particular Mr. V. M. Bam of Middledrift Secondary School, Mr. E. S. Bundy, Principal, Jabavu Secondary School, Mr. M. Dandala of Healdtown, Mr. J. W. Macquarrie, Inspector of Schools, Alice, Professor O. F. Raum, Department of Education, University College of Fort Hare, and Professor D. Z. de Villiers, Department of Psychology, University College of Fort Hare.

W. NORMAN TAYLOR



DAILY HEALTH AND CLEANLINESS INSPECTION

A TEXTBOOK OF HYGIENE FOR TEACHERS IN AFRICA

by

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INTRODUCTION

Health education consists not so much in teaching people what to do, but in developing the kind of people that will do what they know should be done.
—Robert Yoho

Health in Africa

Few teachers will dispute the fact that there is an urgent need to do all we can to try and improve the health of the underprivileged sections of our African populations. The signs of a sick society are obvious. Death is a commonplace event. We all know of many young men and women who have died while in the prime of their lives. Those that survive are senile and feeble when they should still be enjoying the fruits of middle age. Few Africans of 70 could perform the work that Sir Winston Churchill does at 80. A quarter of all African babies born die before they reach even the age of one year. At schools, absences due to sickness are so common that often a quarter or half of the children are away. The teacher has only to look around those pupils that are present in his class in order to see where the hand of sickness has touched. Many of them have sores on face and scalp, running eyes and noses, frail bodies and tired faces.

But lest I should be painting too black a picture, let us at once look at the encouraging side of things. People of African origin are, when conditions are favourable, strong and vigorous. African men can perform more strenuous work under harder conditions than can many white men. African athletes have shown that they are second to none in the world. Africans can survive in unhygienic conditions that would kill other races. Extremes of cold or heat leave

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PREFACE

This little book is based on a series of lectures given in the University Education Diploma course at the University College of Fort Hare, during the past few years. It is thus a book intended for teachers. It is not a text-book of school physiology and hygiene, and therefore will not directly help teachers to get their pupils through the matriculation examination, but it is hoped that it will help teachers to obtain something far more important than examination results, namely healthy children to teach. In writing for teachers my object has been not so much to *inform* them as to *educate* them, to give them an understanding of health and particularly to impress upon them their responsibilities with regard to the health of the children in their charge.

Much of the ground covered in the first five chapters has been adequately dealt with by many other text-books of school hygiene. My object in repeating these topics has been to pick out the essentials, to sift the oats from the chaff, to attempt to give the reader some sense of proportion about these matters. What is included in these chapters is merely what any educated person ought to know. There are therefore many details left out, details which in many cases may be essential for the secondary school child taking examinations on the subject. For such persons other books must be consulted.

The sixth and seventh chapters deal with subjects which are almost entirely omitted from the ordinary books on school hygiene, yet they are probably the ones of greatest importance to the continuation and welfare of the human race. I refer to reproduction and mental health. Certainly there are no two subjects about which there is so little non-technical information available, and about which there is so them unaffected. Although so many African babies die, it is highly probable that if European babies were exposed to the same hazards they would die in far greater numbers. When an African, in good health, gets a wound it seems to heal quickly. Africans do not get nearly so much cancer, stomach trouble, or psychological trouble as the Europeans. And, as if to prove their virility, and their ability to withstand all the shocks brought about by the great cultural changes of our time, the African peoples are steadily increasing in numbers. The Bantu population in the Union of South Africa alone has more than doubled in the last fifty years. Other races in similar conditions, Hottentots, American Indians, Australian aboriginals, have faded away.

The Importance of Health

We must not, however, look upon health merely as the avoidance of disease or something which enables us to live longer. Health is something of tremendous value for its own sake. Health is what enables our minds and bodies to work fully and efficiently; it enables us not only to live successful and satisfactory lives, but also enables us to make our contribution, to play our part, with the rest of humanity among whom we find ourselves living.

In our modern world health is not just something that happens naturally. It has to be striven for, to be worked for, to be sought after. Some fortunate people are "naturally healthy", but usually because they have been fortunate in their upbringing, and fortunate in a type of work and way of life that provides them with the correct exercise and nourishment and shelter. The rest of us must at all times be careful to give our bodies and minds all the care to which they are entitled, to preserve their strength and efficiency, and to enable our lives to be bright and useful, so that at the end of our allotted span of life we leave the world better than we found it.

Without health, we, as individuals, cannot contribute much towards mankind, indeed we may be a drag, be parasites upon the energies of others. This is not to say that all unhealthy people are useless burdens on society. On the contrary, many invalids have made contributions, particularly in the arts, but they are a very small number compared with the total load of sick persons that society has had to carry.

Without healthy people society cannot progress, civilization cannot develop. Where people are continually struggling to exist at all, struggling to keep the birth rate ahead of the death rate, they do not have much time or energy to spare on the finer things of life. All art, all learning, all science, all philosophy, all commerce and all politics, depend on our being healthy enough to utilize and appreciate them.

If the object of our lives is the service of mankind, and if that service is difficult or impossible without health, then clearly the attainment and maintenance of health is one of the most important of the tasks and duties in our day-to-day lives.

Similarly those who are entrusted with the care and upbringing of children, whether they be parents or teachers, have a great responsibility to see that those children grow up not only possessing the right knowledge and attitudes about health and its maintenance, but also possessing bodies properly grown and minds properly ripened.

The Objects of Health Education

It must follow that the study of health is the most important subject in any school or college curriculum. But merely studying health is not sufficient. The study is not an end in itself but a means to an end. The object is to make people healthier, and unless this object is attained the study is sterile and pointless. Mere knowledge of health is not enough; it is the practice of the healthy way of life that matters. Teachers therefore have the added duty of seeing that their pupils actually *are* healthy, that their bodies and minds are sound, that they have the desire for health, that health is an ideal always before them.

It does not follow that if people *know* about health they will necessarily be healthy. This is a great fallacy found not only in schools but often also in the big organizations engaged on so-called "health propaganda". The child with the best marks in the hygiene examination paper is not necessarily the healthiest child in the class. Opportunities must be given for the children to see, to experience, and to live what they study, so that sound knowledge and habitual practice of hygienic principles become part of their lives, not only in school but later when they take their place as citizens in their community. (This point is dealt with further in Chapter 11.)

The Importance of Health for School Children

It has been said that "the child is father to the man". This means that the quality of man that enters adult life depends on the way he has been treated as a child. Healthy children become healthy adults. The health of society tomorrow depends on the health of the children today.

If signs of departure from health are discovered during childhood, it is much easier to put them right while the body is still growing. For example, a child with a crooked spine can be cured in time for him to earn his living as soon as he is fully grown. Particularly is mental health important in childhood. The child's mind can be moulded into desirable patterns, but the adult's mind may be permanently fixed in unhealthy neurotic lines.

Childhood is a time of great bodily and mental change. Not only is there the process of continual growth, but there is also the great upheaval of change into manhood or womanhood at the time of puberty. It is obviously best that the children's bodies and minds should be healthy and strong when all these changes take place.

It is sometimes not realized by teachers that children in poor health cannot learn their lessons properly. The child who may appear to be lazy or dull may often be suffering from a low state of health. The teacher's efforts are wasted, and the child may actually suffer cruelty, unless his health is put right first. Alternatively, lessons may have to be specially adapted for those who are below average in health.

The Content of School Hygiene

School Hygiene is not just a subject in the syllabus that has to be satisfied. School Hygiene embraces all activities in the school which encourage and safeguard health. In addition to the actual classroom work, there is firstly the supervision of the child's health and the correction of any defects found, and secondly, ensuring that the child is not exposed to any harmful effects, either from the school premises or from the other pupils. School Hygiene is not just a matter for one teacher, but for the whole school, from the Caretaker to the Principal, and embracing too the Parent-Teachers Association and the local Health Authorities.

The content of School Hygiene can be regarded under three headings: (1) HEALTH TEACHING; (2) HEALTH SUPERVISION; (3) HEALTH PROTECTION AND PROMOTION.

(1) HEALTH TEACHING. This is the classroom work aimed at equipping the child to live a healthy life. It does not only consist of giving him knowledge of how the body works, how to look after the body, how to avoid disease. We have to go further than the mere instilling of factual information. We have to inspire the child with a desire to be well and happy, so that health habits are a pleasure to him. We have to equip him so that he can act intelligently for himself. He should have a scientific attitude towards health, free from superstition or mystery. He should feel a sense of responsibility for the health of others, and understand that there are communal regulations about health for the good of all.

But the child does not only learn in class. The whole school, the buildings and the teachers, should be a continual demonstration of healthy living. There should be clean lavatories and tidy grounds, and teachers with clean clothes and tidy habits. The health supervision and health protection discussed in the next two paragraphs are all direct or indirect lessons.

The actual techniques of teaching health are dealt with in Chapter 11. Suffice it here to stress the importance of motivation, of illustrations from real life, of taking opportunities in other subjects such as biology or geography to focus the pupils' attention on health matters.

(2) HEALTH SUPERVISION. It is the teacher's duty to see that all pupils are fit to receive education, and that attending school is throwing no strain on their individual health.

Some of the commoner defects found in school children are the following: poor eyesight, poor hearing, malnutrition, chronic infectious diseases such as malaria or tuberculosis, frequent minor ailments such as tonsillitis, sores or parasites, psychological anxiety, lack of intelligence.

It is important for all teachers to be sure that their pupils are not suffering in any of these ways. Where defects are found the children should be sent for correction. Where there is a school doctor or school nurse to advise the teacher, or arrange these matters, so much the better, but the responsibility for seeing that all pupils are fit must rest on the teacher himself. The other health workers are merely there to help him (see Chapter 8).

(3) HEALTH PROTECTION AND PROMOTION. Children at school have, for a time each day, left the shelter of parental love and care. Teachers have a responsibility to see that the children during that time are not exposed to any risks to their health, either of mind or body. The school itself must conform to hygienic standards. Other children suffering from infectious diseases must be kept away. The teachers themselves must be healthy, free from infectious disease or distorted mental outlook.

Only children fully immunized so that they are safe from certain diseases should be allowed in school.

Adequate care should be taken to prevent accidents either in the school or when children are travelling between school and home. Where minor accidents or sickness occur, facilities for first-aid or simple treatment should be available.

Positive health is encouraged by the provision of suitable physical exercise, dietary supplement, such as school dinners, by the practice of cleanliness and tidiness, and by ensuring a happy mental atmosphere in the school.

* * *

That, then, is the modern ideal. Healthy children, equipped with healthy attitudes and ideas, educated in healthy schools by healthy teachers. The practice of this ideal is, in far too many schools, extremely difficult. But as long as teachers begin to realize the existence of this ideal, then progress is being made.

PART I

GENERAL HEALTH

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Chapter One

THE BODY

A Human Being

If a man owned a bicycle and yet did not know what to do when a tyre went flat, we should think of him as a very silly man indeed. Every boy knows, or should know, also how to keep that bicycle in good running order, to keep the tyres pumped hard, to keep the wheels oiled, to keep away rust.

A motor car is a much more complicated machine than a bicycle, but everyone who owns a car and wants it to last a long time (which is not quite the same thing as saying everyone who *drives* a car), learns how to take care of it and knows what to do when something goes wrong. He knows he has to give it fuel (petrol) to make it move, he has to give it water to keep it cool and oil to keep it running smoothly. He knows how to change a wheel and how to adjust the carburettor which mixes the petrol with air so that it can explode properly. If something serious goes wrong he recognizes that it is beyond his powers and calls in an expert to put it right.

All of us own a machine that is much more complicated than either a bicycle or a motor car. We not only own it, we live in it, and depend upon it for our very existence. The only pleasures we have are given to us by this machine. It is only by its marvellous instruments that we know of the existence of the world around us, indeed, that we know of our own existence. If this machine suffers, we suffer with it. When it finally breaks down beyond repair we cannot get a new one—our life as we know it on this earth goes out on the junk-heap with it.

This machine is of course that wonderful thing, the human body. It is a machine in one sense, but who has ever heard of a machine that can drive itself, that can give itself fuel, that can repair itself (if not damaged too severely), that can decide on the type and quantity of work it can perform, that can produce other similar little machines that grow up beside it? The reason why this machine is so different from all other machines we know is that it is *living*, it has the quality we call *life*. Here is not the place to attempt to define what we mean by the word life, except that life is, very simply, the difference between living and non-living things. Which does not tell us much.

The human body is the most wonderful of all forms of life. Outwardly it perhaps does not appear to head the list. It is not as strong as the lion's body, it is not as graceful as the antelope's, it is not nearly as beautiful as the butterfly's or the tree's or flower's. But there is one quality it has which puts it above all else; the human body has the best *mind.*

Mind is another of those words hard to define. Perhaps it is wiser not to try. Mind is that which puts meaning and purpose into life. Mind is the ultimate "I" living inside each of us. Certain it is that body cannot exist without mind, and mind cannot exist without body. They are two aspects of the same wholeness.

For the sake of convenience of study, however, we can study the body and the mind separately, though always remembering their dependence on each other.

There is also a third part of our make-up, the spirit or soul, but discussion of this would take us into the realm of religion and metaphysics.

The Structure and Functions of the Body

The study of the structure of the body is called *Anatomy*. The study of how the body works is called *Physiology*. In the succeeding pages we shall not try to separate these two aspects, since, at this level, the one cannot be properly appreciated without the other.

We all know that the body consists of different parts, or *members*—the head, the eyes, the legs, the toes, and so on. Internally there are the various *organs*, the brain, the stomach, the heart, and many more.

For the purposes of study these various parts are usually taken together in groups, according to their function. Such groups are called *systems*. There is the system which maintains the shape of the body, and enables it to move. This is the *musculo-skeletal system*. There is the system concerned with taking nourishment and oxygen round to the tissues and flesh, and carrying away waste products: the *blood system* or *circulatory system*. There is the system which puts oxygen into the blood and extracts carbon dioxide: the *respiratory system*. There is the system which keeps all organs in telegraphic touch (as it were) with the brain, and the brain with the outside world: the *nervous system*. There is the system which turns food into suitable nourishment for the body to dissolve and transport: the *digestive system*. There is the system which washes out waste chemicals: the *excretory system*. There is the system which enables the body to reproduce its kind: the *reproductive system*.

There are many other functions of the body which cannot be included in this list. There is the system whereby the the body keeps itself at the same *temperature* all the time; there is the *hormonal* system, the system which supplies chemical substances to the blood which stimulate the tissues and the emotions in various ways.

The word *tissues* was used in the last paragraph. This is the word used to describe the material or substance of which the various parts of the body are made. If we look at any part of the body under the microscope, we should see that it is made up of a mass of *cells*. Indeed all living matter is made up of cells, whether it is a single celled animal like the amoeba, or the relatively large cells seen in the cut stem of a plant. The word cell means a little room in a big house, for example a prison cell. Each part of the body, each organ, then, is made up of millions of these tiny cells. But that is not all. Inside each cell is a nucleus, and inside each nucleus are chromosomes, and inside the chromosomes are things called genes, and no doubt inside the genes are even smaller things *ad infinitum*. So it can be seen that the body is a very wonderful thing indeed, and looking at the tissues under a microscope does not take us very far in studying it.

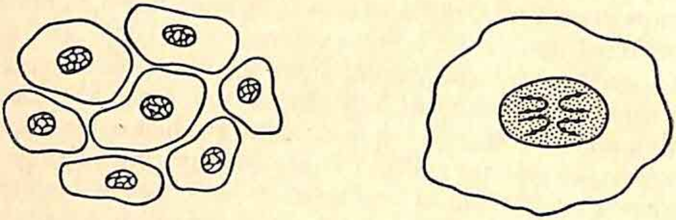


FIG. 1. CELLS MAGNIFIED MORE THAN A THOUSAND TIMES

In each is a nucleus, and on the right the nucleus is enlarged to show the chromosomes

The whole of the inside of the body is full of *water*. Every cell is full of water, the spaces between the organs are full of water, the blood is mostly water. Any sort of life can only exist in the presence of water, whether it is a plant, an animal, a germ or an amoeba. Nothing can be dry and stay alive. (Even seeds are never *completely* dry if they are ever to grow again.)

All the chemical actions that are necessary for life are carried on in solution in water. The solution may be complete or partial (colloidal). The exchange of materials in solution (solutes) takes place by means of the physical process known as *osmosis*.

All this shows how important water is for our health.

Just as each organ has a different shape and function, so we find that the tissue cells of each are different. Liver cells are different from kidney cells. Muscle cells are different from bone cells. And in any one organ there may be many different types of cells with differing jobs to do. But any one cell can only do one particular job. In the gut one kind of cell produces digestive juice, another soaks up the digested and dissolved food. There are nerve cells that take messages of pain only, others send movement messages. The red blood cells are freely floating and carry oxygen; the white blood cells are also free and attack germs, and so on. It is a state in which every cell knows his own job and sticks to it, but at the same time all of them are working harmoniously together with one ultimate object, the perfectly functioning body.

In the following pages no attempt will be made to explain the detailed anatomy and physiology of the body. The author feels that all that an educated teacher need know is the names, positions and duties of the principal parts. For further details reference books can be consulted.

The Musculo-Skeletal System

The Bones

The function of the bones is to give strength and rigidity to the body. A man with no bones in his legs would not be able to stand, or, if he had no bones in his hands, he would not be able to grip. The bones are the framework, the reinforcement, around which the rest of the body is built.

The ribs, the bones of the chest, have the additional function of forming a rigid basket enclosing the lungs, which is unaffected by alterations in air pressure.

The skull forms a hard shell enclosing the brain. The brain is the most delicate of all organs and has to have this extra protection. The eyes and ears are similarly protected.

The names of the bones which should be known are given in Figure 2.

The Muscles

We have more muscle in our body than any other kind of tissue. Muscles are the fleshy parts, which, in the case of animals, is the part that we call meat.

The function of the muscles is to move the bones. There are many different muscles, all shapes and sizes. One end is attached to one bone, and the other to another bone. Each particular muscle can only do one movement, namely pull-

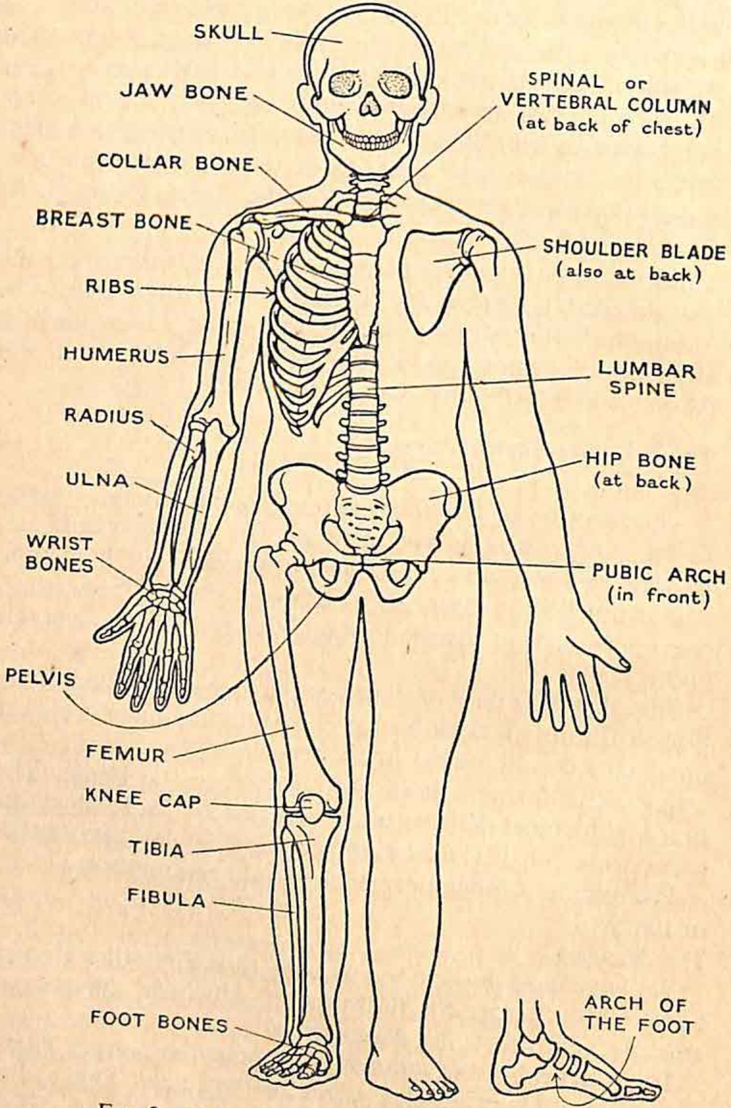


FIG. 2. THE MORE IMPORTANT BONES IN THE BODY

ing the two bones towards each other, that is to say, lessening the angle between bones. But by having so many different muscles, attached in so many different places, all sorts of movements are possible. One muscle pulls forward, another back, another sideways, and so on.

Muscles also have the job of maintaining posture. The muscles of the back, buttocks and calves for example, hold up the body by continually pulling the spine, pelvis and leg bones backwards, but not too far back, counteracting the natural tendency of the body to fall forwards.

Muscles are always at work as long as we are awake. Even while we sleep they do not all completely rest and relax.

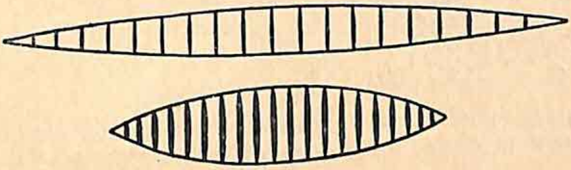


FIG. 3. MUSCLE CELLS

The upper one is at rest, the lower one is pulling

Muscle tissue consists of bundles of long thin striped cells. Each cell has a nerve string (fibre) attached. When it receives a message from the brain, carried by the nerve, the cell responds by getting shorter and fatter. If many cells all do the same at once then the whole muscle gets shorter and fatter. Pupils can test this for themselves by making their biceps muscle contract, or the muscle of the jaw.

For a strong pull many cells contract, for a gentle pull a few are used. If muscles are used more strongly than usual each cell increases in size so that the muscles get bigger. This is what happens when an athlete trains himself. Conversely, if the muscles are not used, some of the cells disappear and the muscle gets thin. This is what happens when a patient lies long in bed, or when a broken bone is kept long in a splint.

The Blood, or Circulatory System

The blood system is the transport organization of the body. The blood vessels can be compared to railways and roads, and the blood itself to the trains and lorries and buses.

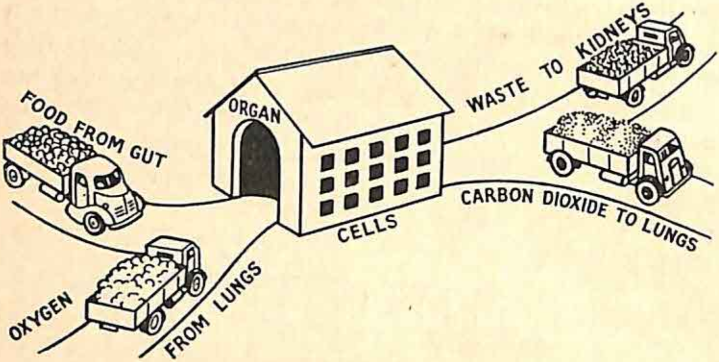


FIG. 4. BLOOD IS THE TRANSPORT SYSTEM OF THE BODY. IT CARRIES FOOD AND OXYGEN TO EACH CELL, AND TAKES AWAY THE WASTE

The function of the blood system is to see that all tissues are continuously supplied with nourishment and oxygen to keep them alive, and with other chemical substances to make them work properly. The food is collected from the gut and liver, the oxygen is collected from the lungs. The other chemicals (internal secretions or hormones) are collected from glands in various parts of the body.

The blood *circulates* throughout the body in a one-way system. It is forced out to the various parts by the pumping action of the heart through special tubes called *arteries.* The arteries have rigid walls like a rubber hosepipe, but they are elastic enough to expand slightly every time the heart pumps (beats).

In the tissues the arteries branch out, gradually becoming a network of very fine tubes called *capillaries*, running among the cells. The various chemical substances soak out of the capillaries into the tissues.

The tissues at the same time give up their waste products, their smoke and ashes as it were. These are of course in solution in water and soak out into the blood in the capillaries. The commoner of these substances are carbon dioxide and nitrogen waste (urea).

After passing through the tissues the network of capillaries gradually gather together as tributaries eventually forming another tube, which is called a *vein*. The veins are soft and flabby, and the blood is forced along them when they are squeezed between the muscles. This shows the importance of exercise for a good circulation. Valves in the veins keep the blood flowing in one direction only.

Blood in the arteries is bright red in colour, due to the oxygen present. Blood in the veins coming from the tissues is darker in colour. It is convenient to say the blood is then "dirty", though the dark colour is not due to dirt.

This returning blood is next pushed out by the heart to the lungs where it picks up more oxygen and gets rid of its carbon-dioxide. The nitrogen waste products are eventually extracted by the kidneys, though there is no direct route to the kidneys as there is to the lungs.

The *heart* is a double-chambered pump. The left side pumps out to the tissues, and the right side to the lungs. The blood returning from the tissues goes to the right side and that returning from the lungs goes to the left. There are two chambers on each side. The upper ones (auricles) collect the incoming blood. They have thin walls. The lower ones (ventricles) are the muscular pumps, and they have thick muscular walls. Since the lower left chamber has to pump the blood further than the right, it has thicker and stronger walls.

The heart beats about 100 times a minute in childhood, and 60–80 times in an adult, and never stops day or night. It starts long before we are born, and continues until the moment of death. The beats can be felt by the hand, just under the ribs. The increase in pressure as the heart beats can also be felt in the arteries, such as the one at the wrist (above the base of the thumb) and the one on the side of the head in front of the ear. These beats are known as the *pulse*.

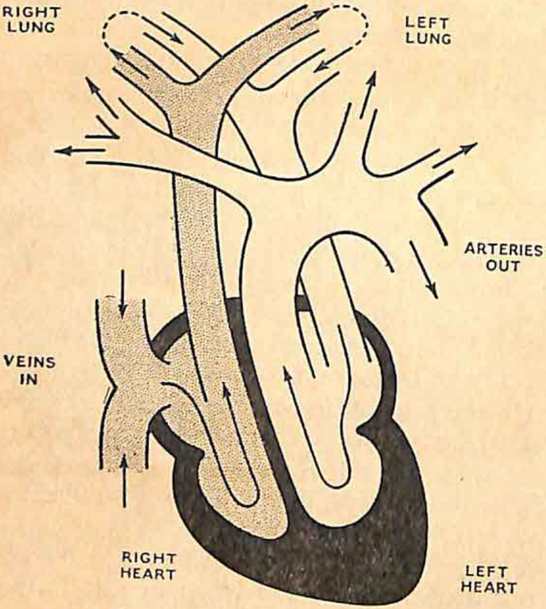
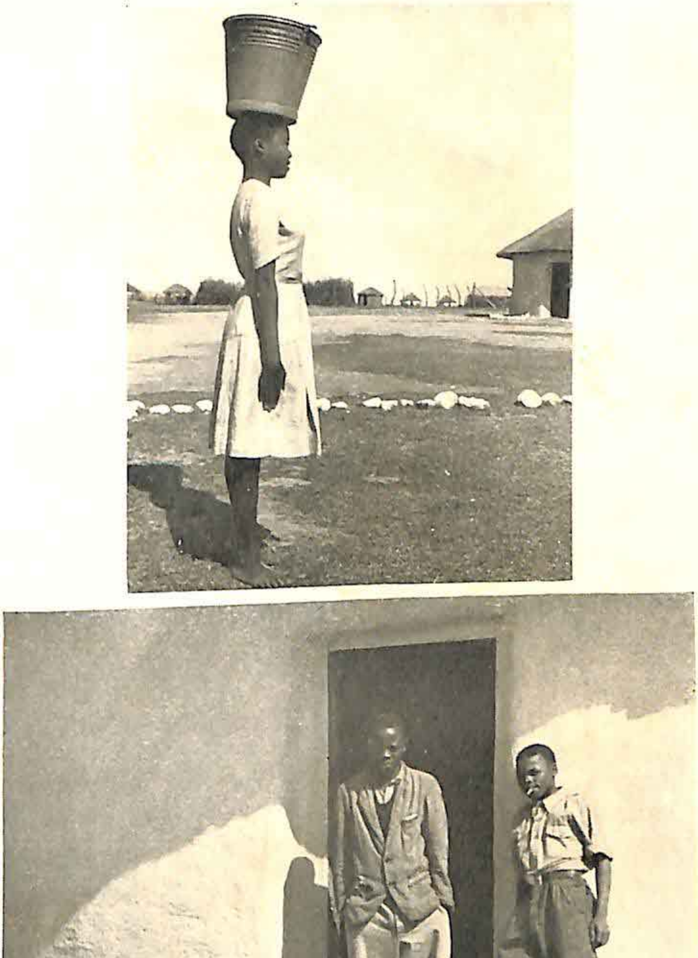


FIG. 5. DIAGRAM OF A HEART SHOWING THE COURSE OF BLOOD

Note the thick muscular walls of the left ventricle

When extra blood is needed, such as when the body is doing strenuous exercise, or when the body is suffering from a disease causing inflammation (see Chapter 9), the heart beats faster. The heart also beats faster when the person is frightened or worried; this is in preparation for strenuous action.

The *blood* itself is made up of two main parts, the cells, and the fluid. The cells are (1) *red cells*, which carry oxygen, and (2) *white cells*, which look rather like amoebae, and act as soldiers attacking germs, or as scavengers collecting up damaged or useless tissue substance.



GOOD AND BAD POSTURE

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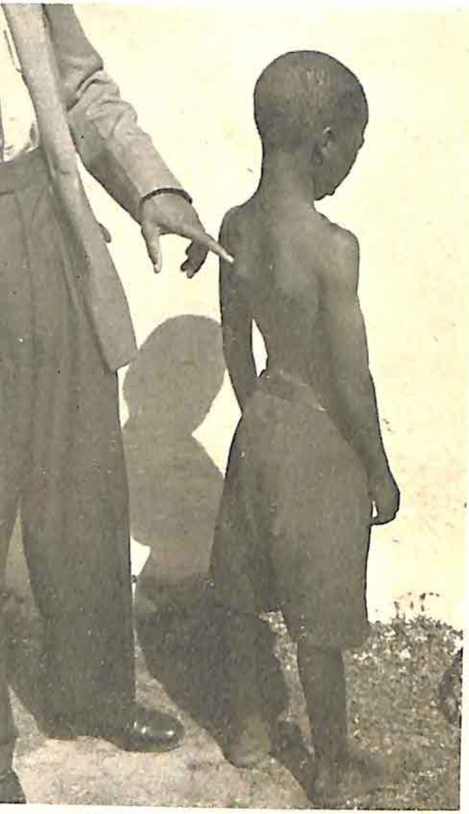
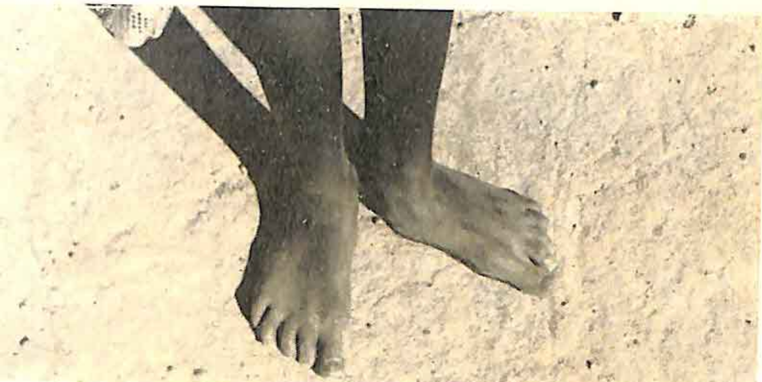


POOR POSTURE SHOWING THE UNNATURAL CURVE OF THE SPINE AND THE PROMINENT SHOULDER BLADES



COLLAPSED OR FLAT FEET

The fluid part is a solution of the various chemicals, nourishment or internal secretions, which the blood is carrying. It also continuously carries certain disinfectant chemicals (antibodies or antitoxins) for use against germs. And it carries a solution of glue-like substances which will solidify to form a clot to stop the bleeding if the vessels are damaged. The whole fluid is called *plasma*. The fluid without the clotting substances is called *serum*.

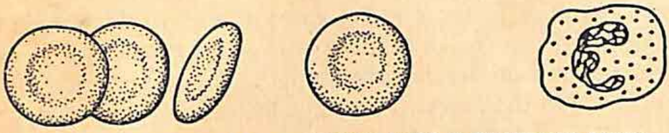


FIG. 6. BLOOD CELLS, MAGNIFIED OVER A THOUSAND TIMES
The disc-shaped cells are the red ones, and the amoeba-like one is a white cell

There are about 10 pints of blood in the body. If more than 3 or 4 pints are lost, due to a wound, it is a serious matter, especially if the force (blood pressure) of the heart is weakened by shock (see page 224, Chapter 9). Such a condition is treated by transfusions of blood or plasma, or some similar substance. Friends supplying the blood for transfusion can give a pint each with no ill effect, provided they are normally healthy.

Blood used for a *transfusion* must match the blood of the patient. There are four different kinds of blood, or *blood groups* as they are called. No one knows what kind of blood he has unless it is tested. A blood transfusion from a person of a different group does more harm than good.

There is another set of vessels for the flow of fluid from the tissues to the heart. These are the *lymph* vessels. They are especially numerous from the gut, and carry extra loads of digested fat. They occur in all organs, however. At the point where they leave an organ or limb, are small knobs of tissue called lymph *glands*. They can be felt at the top of the leg, for example, and in the neck. Their function is similar to that of a filter; they filter off any dirt or bacteria that may have got into the tissues and which may have been collected

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by the lymph fluid. Lymph fluid is clear white in colour; it contains no red cells.

The Respiratory System

The function of the respiratory system is to draw air in and out of the body, so that oxygen can be taken up by the blood and carbon dioxide given off. This exchange of gases takes place in the *lungs*. The lungs lie, one on each side, in the chest, and consist of an intricate network of branching air vessels, and blood vessels, too fine to be seen with the eye.

The air enters and leaves the lungs by the respiratory passage. This consists of the nose, the pharynx, the larynx, the trachea and the bronchi.

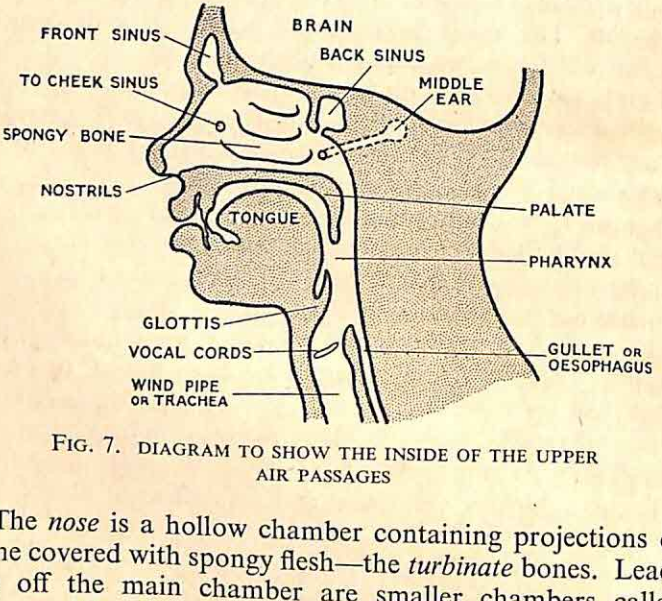


FIG. 7. DIAGRAM TO SHOW THE INSIDE OF THE UPPER AIR PASSAGES

The *nose* is a hollow chamber containing projections of bone covered with spongy flesh—the *turbinate* bones. Leading off the main chamber are smaller chambers called *sinuses*. The object of it all is to make the air circulate among these knobs and chambers, rather than letting it go straight through. By this means it is made warm and moist, and free from dust, so that it is in just the right condition to enter the lungs without harming them.

The *pharynx* is the chamber immediately behind both the nose and the mouth. It is thus at the cross-roads, as it were, where the alimentary passage crosses the respiratory passage. It is also of interest because guarding the nose exits and the mouth exit are lumps of lymph tissue, the *adenoids* and *tonsils* respectively, whose duty is to kill all germs getting that far, if they can.

The *larynx* lies below the pharynx. It has a trap-door entrance, called the *glottis*, which automatically shuts when food is being swallowed. The larynx has firm walls, made of *cartilage*, making it into a box. The larynx is sometimes called the voice-box, because it contains two folds of strong skin, called the *vocal cords*. As breath passes out between them they vibrate making the noise which we use as our voice. By tightening or loosening them—as on a banjo—we can vary the pitch. The larynx in its cartilage box can be felt in the front of the neck. It is prominent in men who use their voices a lot, and is sometimes called the "Adam's apple".

The *trachea*, or windpipe, leads down from the larynx to the chest. It has rings of cartilage which keep it wide open at all times, so that there is no danger of it getting pressed on and closed up (except by great force, as in throttling or strangling). These rings can often easily be felt with the finger in the front of the neck. Lining the trachea on the inside are very fine hairs, called *cilia*, which are continually sweeping upwards any dust or slime (*mucus*) that collects on the walls of the windpipe.

Just under the breast bone the trachea branches to each side of the chest into pipes called the *bronchi*. These in turn branch into finer branches called *bronchioles*.

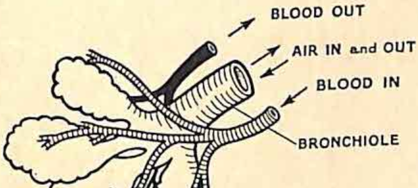


FIG. 8. A HIGHLY MAGNIFIED VIEW OF THE END OF EACH BRONCHIOLE

Each lung consists of a mass of these balloon-like alveoli

These repeatedly branch until finally the end of each becomes a minute balloon, so small that it can only be seen under the microscope. These are called the *alveoli*, and they lie in the network of blood vessels already described.

The *lungs* are masses of these alveoli and blood vessels. Each lung is covered by a thin skin called the *pleura* and lies inside the rigid framework of the chest, called the pleural cavity.

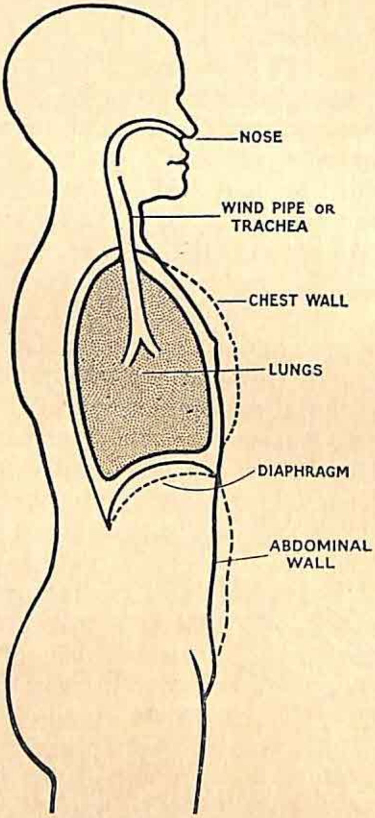


FIG. 9. THE MECHANISM OF BREATHING

This shows the direction of movement of chest wall, diaphragm and abdominal wall. The dotted line shows the position at full respiration

The bottom of this cavity is formed by a big dome-shaped muscle called the *diaphragm*. As this pulls downwards so it draws air in. As it relaxes it is pushed up by the abdominal contents, so forcing air out. At the same time as the diaphragm pulls down, the ribs are pulled outwards by their muscles making the volume inside larger, which also helps to draw air in. When the rib muscles relax the chest wall collapses elastically and the air is forced out. Thus it can be seen that it is easier to breathe in than out, breathing in being muscular effort, breathing out being mostly elastic recoil. When we want to breathe out forcibly, as in shouting or coughing, we have to use our abdominal muscles to force up the diaphragm.

The diaphragm acts rather like a piston moving up and down in the cylinder of a car, or the plunger in a doctor's injection syringe. In the case of the chest, though, the cylinder walls can also expand.

When there is too much carbon-dioxide in the blood the brain sends a message to the muscles of respiration, and breathing automatically becomes faster and deeper. We say we are "panting", or "out of breath". In order to get air more quickly we are forced to breathe through the mouth, as the nose route is too slow. Conversely, if we deliberately breathed too deeply, we should find that after a few minutes we would stop breathing and be unable to start again for a while.

The Nervous System

The nervous system is often compared to the telephone system in a city. The cells, which are called *nerves*, are long and thin like wires, and their duty is to carry messages. These long nerve cells run out from the brain, down the spinal cord, enclosed in the vertebrae of the spine for protection, and branch out to every organ, every part, even to almost every cell in the body. The brain can be likened to a super telephone exchange. All down the spinal cord are small local exchanges in addition.

One set of nerves carries sensation messages *from* the tissues *to* the spinal cord and brain (the afferent nerves), and another set carries action messages *from* the spinal cord or brain to the tissues (the efferent nerves, sometimes called motor nerves). Another whole set of nerves, the autonomic nervous system, is concerned solely with keeping the organs in working order. They carry messages relating to the chemistry of the blood, the rate that food is travelling along the bowel, the size of the pupil of the eye, the warmth of the skin, and so on. Normally we are not aware of their workings, but sometimes, especially when we are emotionally disturbed, it affects these nerves. For example anger will upset digestion, fright will make one's "bowels turn to water".

The ordinary afferent nerves are, however, concerned with what we call the conscious *senses*. There used to be described the *five* senses of man: seeing, hearing, tasting, smelling and touching. There are, however, several others, as we now know. The sense of pain, the sense of temperature (hot or cold), the sense of balance, and the sense of position, are some more. (The latter is the sense which tells you where any limb is at any one moment. It enables you to put food unerringly in your mouth in the dark, or to scratch a certain spot on the body without looking.)

There are also the so-called "extra-sensory-perceptions", those that used to be called a "sixth sense". An example is the sense which some people have of being aware that danger is threatening someone else, usually someone they love. Some animals have other senses that humans apparently have not. For example there is the sense possessed by bats that enables them to fly in the dark without hitting anything. Then there is the sense that some birds like wild ducks have, which enables them to fly in formation, and there is the "homing instinct" of pigeons.

In this book we can only concern ourselves with the more obvious senses, seeing, hearing, tasting, smelling, balance, touching, pain and so on. These sensations are picked up by special nerve cells, which are capable of responding only in one particular way. If a pain nerve is touched you feel pain,

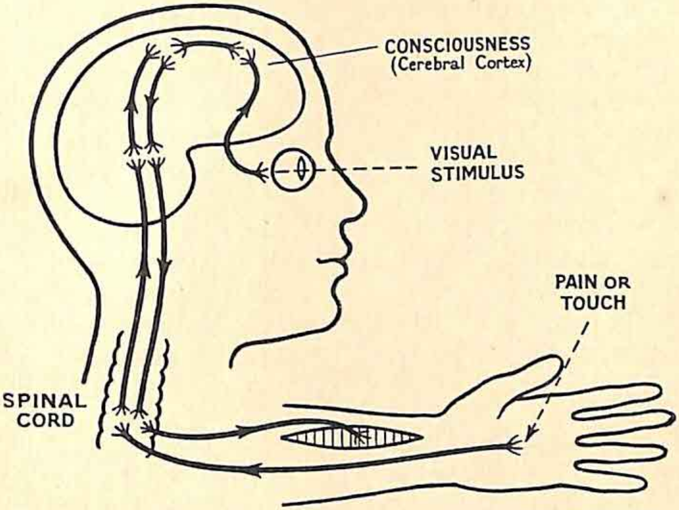


FIG. 10. DIAGRAM TO SHOW HOW NERVE CELLS CARRY MESSAGES TO A MUSCLE AS THE RESULT OF PAIN OR TOUCH, AS A SIMPLE REFLEX CIRCUIT, OR, AS A RESULT OF A VISUAL STIMULUS, TRANSFORMED INTO MOTOR STIMULUS IN THE BRAIN

if a touch nerve is pained (say pricked) you feel touch. Touch the side of your eye and you will *see* a blur—on the opposite side. In the case of the first five senses mentioned the special nerve cells are located in special organs, the eyes, the ears, the tongue and the nose, and the ear again, respectively. The others are spread throughout the parts of the body that we are conscious of. The nerves of touch are particularly concentrated at the tips of the fingers and the tip of the tongue, while they are scarce in the skin of the back.

It is through the senses conveyed to the brain by the afferent nerves that we know what is going on in the outside world, and we react accordingly. If we touch a hot cinder with our finger we draw away our arm at once. What happens is that a message goes up the afferent nerve from the pain cell, through the local exchange in the spinal cord, and back along the efferent nerves to the muscles of our arm, At the same time a message goes on up the spinal cord to our brain, so that we become "conscious" of the pain. This is called a simple *reflex* action because we have moved our arm away automatically, without waiting for the brain to tell the arm.

Supposing, however, we *see* the hot cinder falling on to our hand; we then move the arm only as a result of a message from the brain.

On a higher level still we might, say, read of some danger threatening in the future, and decide what to do with ourselves and our family. This is a process of conscious *thinking*. In this case the message comes in by the eyes, and is, as it were, "digested" in the brain; the necessary efferent messages are planned and deliberately sent out in due course.

Unlike any known telephone exchange, messages can be stored in the brain, and acted on as required. This we call *memory*. The brain has many other abilities, which would lead us into a discussion of what we mean by the *mind*. But that will be dealt with in Chapter 7.

Another important type of reflex which we should try to understand, however, is the *conditioned reflex*. We can, as an illustration, use the original experiment conducted by the famous physiologist, Pavlov. It is well known that the mouth waters at the sight of food. This is a simple reflex. The same thing happens with dogs. Pavlov used to ring a bell every time food was brought to his dog. Soon he discovered that merely ringing the bell, without the food, made the dog's mouth water. The original reflex had become "conditioned"; the sound of the bell had been substituted for the sight of the food. The conditioned reflex is of great importance in psychology, where behaviour may be due to causes that are not so obvious as one might think.

As in all physiological processes the great feature about the nervous system is the perfect harmony with which it works. It is a continuous story of co-operation and co-ordination to maintain the health and comfort of the body and mind, both from within and without.

The Digestive System

The function of this system is to take food into the body, to treat it with chemicals (digestive juices), so that everything of use to the body is reduced to a simple soluble substance that can be carried by the blood, and finally to get rid of the unusable surplus.

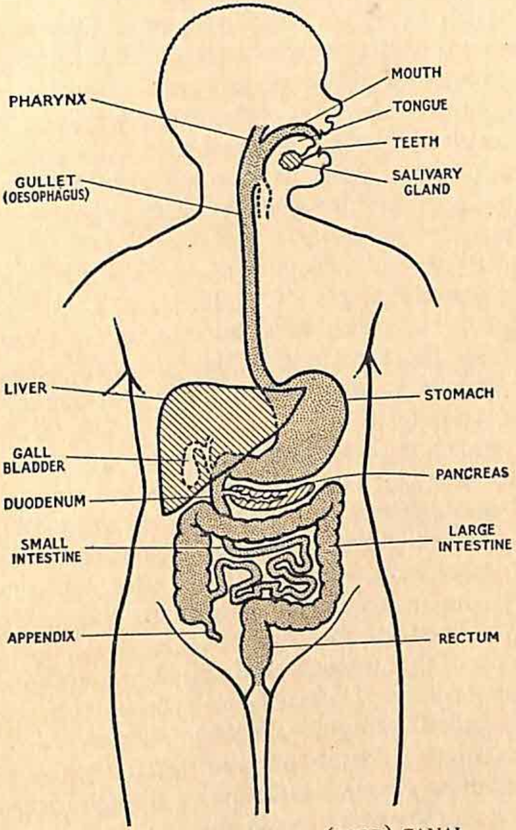


FIG. 11. THE ALIMENTARY (FOOD) CANAL

All this takes place in the *alimentary canal*. This passage starts at the *mouth*, passes back across the respiratory passage at the *pharynx*, down the back of the chest as the *gullet* (*oesophagus*), into the large sack called the *stomach*, on through 22 feet of *intestines* (sometimes called the *gut*), and finally out of the body at the *anus*.

The *mouth* has several functions: (1) *Taste*, which enables us to recognize whether it is food that we are eating, and, if so, what kind of food it is. (2) *Chewing* (*mastication*), which breaks up the lumps of food so that they are more readily acted on by the digestive juices. (3) Provision of *saliva*, a slimy watery substance which lubricates the food for the process of swallowing. Saliva is produced in the salivary glands, which lie behind the angle of the jaw. Saliva has also a slight digestive action on starch. (4) The *tongue*, not only to taste the food but also to help to churn it up and form it into convenient portions suitable for swallowing.

The pharynx and oesophagus are of little importance, except as passages to the stomach.

The word *stomach* should be reserved to describe the large sack at the beginning of the gut. It is often loosely used by people to describe the whole abdominal (belly) region of the body.

The stomach is sack-shaped so that it can store a whole meal at a time, which can then be digested at leisure, before the next meal; otherwise we should be eating little bits of food all day, which would not be very convenient.

The stomach wall, like the wall of all the gut, is muscular, so that it can make churning movements, and eventually squeeze the food out into the intestines.

The walls of the stomach produce a digestive juice, usually called *gastric juice*. This contains hydrochloric acid, and a chemical called peptone. Peptone has the property of acting on protein (meat and similar) foods, so that they become simpler chemical substances, though it cannot take this process all the way towards making the food completely soluble.

The stomach has little or no action on fats, starches or sugars. Nor does any digested food soak into the stomach wall to the blood. Water, glucose and alcohol may, however, pass into the stomach wall and be carried to the tissues.

After a few hours, the time depending on the nature of the food, the partly digested meal is gradually passed on into the intestine. The first twelve inches of intestine is called the *duodenum*. Into the duodenum run the outlet of two important organs that supply digestive juices. These are the *gall bladder* and the *pancreas*.

The next 21 feet of intestine are relatively narrow, only about an inch wide. It is usually called the *small intestine*. The walls of the small intestine give off various digestive juices. Unlike the stomach, these secretions are all alkaline. Digestion of all types of food is finally completed in the small intestine, and all that is soluble, and required by the body, soaks into the walls of the intestine where it is taken up by the blood.

Most of the dissolved food enters the intestinal veins, and these run not to the heart but to the *liver*. The liver is a large solid organ lying under the right side of the diaphragm. The liver is simply a chemical factory and store-house. In it the soluble foods are finally rendered into a form that the tissues can use, and from it this nourishment is issued to the blood for transporting to the tissues as required. The liver also makes the *bile*, which is stored in the gall bladder and used as a digestive juice in the duodenum.

The walls of the intestines are muscular and push the food along by a rhythmic wavelike action called *peristalsis*. The contents of the small intestine are liquid.

The last part of the gut is called the *large intestine* or large *bowel*. It is much wider than the small intestine. In it the undigested food accumulates, and water is extracted to make it firmer. This firm undigestible food is called *faeces*. It consists chiefly of cellulose (plant fibre) and also any food eaten to excess. The cellulose is essential to the health of the bowel. It increases the bulk of the faeces and enables the bowels to move the unused food more easily.

Faeces accumulate in the lower part of the large intestine, the *rectum*. There is a feeling of fullness there, and the body then passes them out through the *anus*.

The Excretory System

While the tissue cells are nourishing themselves, certain waste chemicals are formed, particularly carbon dioxide, and others containing nitrogen. These soak into the blood, and get carried to the lungs where the carbon dioxide is given off. Later the nitrogen chemicals (the chief one is a substance called *urea*), are extracted from the blood by the kidneys, in solution in water. This process is called *excretion*.

Leading from each kidney is a thin tube called the *ureter*. These run into the back of the *bladder*, which is a sack in which the urine can be stored until there is sufficient

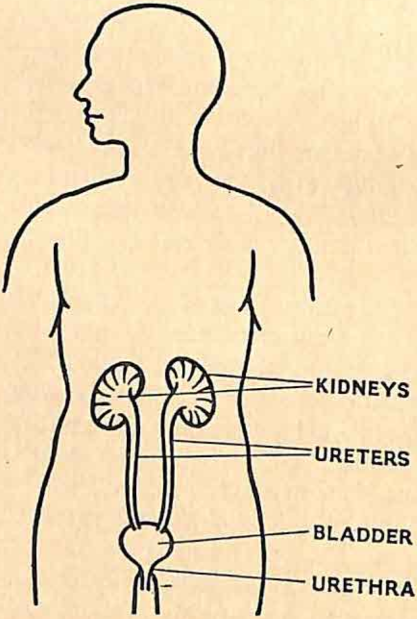


FIG. 12. THE EXCRETORY SYSTEM

to justify emptying. The narrow pipe leading from the bladder to the exterior is called the *urethra*.

Faeces and urine are sometimes called *excreta*, but strictly speaking only urea is "excreted" in the true physiological sense of the word.

The sweat also contains small quantities of urea, but this is merely because the blood, from which the sweat is obtained, also contains it. Sweating therefore should not be considered as a form of excretion (see later).

Temperature Regulation

The process by which the tissues are nourished and kept alive produces an excessive quantity of heat which, if unchecked, would interfere with the chemical reactions. Human life, and all mammalian and bird life, depends on the temperature being continually adjusted to one level. The tissues are kept at this temperature,which in humans is 98·4° F. or 37° C., by the flow of blood through them. In humans the blood is kept cool by the action of the skin, which acts as a radiator. If the body is overheated, more blood flows into the skin where it has a chance to cool. If the skin is not cool enough it gives off water (*sweat* or *perspiration*) which cools the skin by evaporation. Alternatively if the skin is excessively cold, as in cold weather, it shuts off much of its blood supply so that the blood shall not become too cool for the tissues.

A certain amount of heat is also lost in the breath. An athlete, overheated by strenuous exercise, helps to cool himself by panting, taking in large draughts of air through his mouth. Dogs and cattle do the same.

The Internal Glands

Mention has been made of the glands which produce saliva, and the glands which produce digestive juices. There are also sweat glands, tear glands, and many others which produce a juice (secretion) which flows either to the gut or to the exterior.

There are also several glands which produce secretions

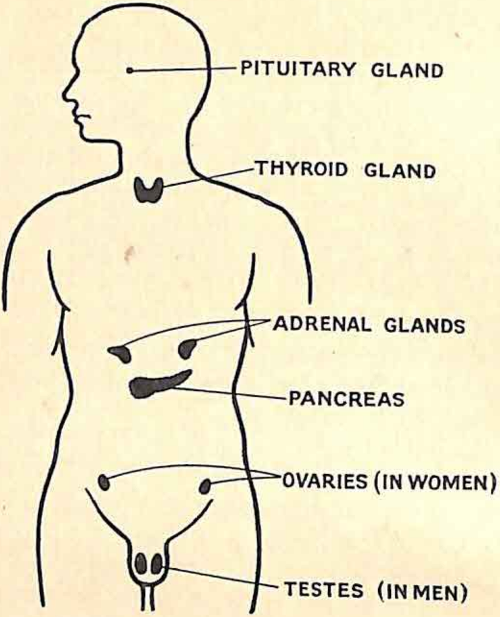


FIG. 13. THE POSITIONS OF THE INTERNAL GLANDS

that flow only into the blood. These are called the glands of internal secretion, or the *ductless glands* (endocrine glands). The secretions they produce are called *hormones*. These hormones are of tremendous importance for the growth, development and general working of the body. They work by stimulating certain cells into activity. Each type of gland produces a different type of hormone, and each hormone causes different effects on the body.

The more important of these glands are:

1. *The Pituitary Gland*. This is situated in the skull, under the brain. It is intimately associated with the brain, which probably influences it to a certain extent. The pituitary gland has two functions: (a) the control of *growth* in children. Children with deficient pituitaries do not grow; they turn into dwarfs. Those whose pituitaries are overactive

become giants. (b) The pituitary has also been called the *master* gland because its secretions stimulate all the other glands.

2. *The Thyroid Gland.* This is situated in the neck in front of the trachea. Its function is to maintain the rate at which the body lives (metabolic rate). If it secretes too much, the body is over active, the heart beats very fast, the person eats a lot yet grows thin, and the mind is over-stimulated so that the brain is full of confused, often anxious thoughts. The eyes tend to be staring.

If the thyroid gland is inactive the person is slow, dull-witted, lacking in energy. If this happens in childhood the child appears to be an idiot, and does not develop properly in any way. Such a child is called a *cretin.*

The thyroid depends for its health on the supply of small quantities of iodine. There is usually sufficient iodine in most natural drinking waters.

3. *The Adrenal Glands.* There are two adrenal glands, one in each side of the back of the abdomen near the kidneys. These are very important for the general working of the body; their action is linked with that of the autonomic nervous system. Extra adrenal hormone (adrenalin) is produced as a result of emotional excitement, particularly fear. It causes the heart to beat faster and generally prepares the body for "fight or flight".

4. *The Pancreas.* This gland has two functions. One, already mentioned, is to produce digestive juice. The other is to produce a hormone called *insulin.* The pancreas is thus both an internally and externally secreting gland.

Insulin enables the body to use sugar as a fuel. It is thus of great importance for the health of all tissues. When there is deficient insulin, sugar cannot be used up and accumulates in the blood endangering life. This disease is called *diabetes.*

5. *The Gonads* (sex glands). These also have a double function. One function is to produce the gametes or sex cells, the other is to produce hormones which develop and regulate the sexual parts and activities of the body.

The female (ovarian) hormones make for femaleness. They turn the girl child into a woman. They develop her breasts and pelvis and start the womb functioning.

The male (testicular) hormones make for maleness. They turn the boy child into a man. They develop his penis, they cause his voice to be hoarse, and they cause hair to grow on his face and body. He becomes mentally a "man", with sexual desire, and capable of working or fighting for the woman of his choice. This effect is more obvious in domestic animals, where the glands are often removed when the animal is young. Their loss means the difference between a bull and an ox. One aggressive and tough, the other placid and tender. This operation was formerly performed on human slaves, particularly in the East, to produce men who could be trusted to look after the women. Such men were called *eunuchs*. The operation of removing the testes is called *castration* or emasculation.

Reproductive System (Genital System)

This will be considered in Chapter 6.

Chapter Two

HEALTH AND DISEASE

Health

Health is one of those words which are difficult to define. The word health really means "That which healeth", and to heal means to make whole, to make into a complete, properly functioning unit. Health then is that which makes for wholeness or completeness. This still does not tell us what health, itself, *is*.

When the World Health Organization—an agency of the United Nations—was founded, all the member nations, 61 of them, had to decide what they meant by "Health". All the wisest doctors in the world thought hard and eventually this was the definition they decided on: "Health is a state of complete bodily, mental, and social wellbeing; it is not merely the absence of disease." There are two important points here, firstly it gets rid of the old idea that being healthy merely means not being sick. That was a negative definition. It is as though you defined goodness as not being evil. Secondly, to be healthy, not only must the body and mind be functioning properly, but they must also be playing a proper part in the society to which they belong.

But even this definition is not entirely satisfactory. Very, very, few of us are in a state of *complete* wellbeing. Those who have lost a tooth or have to wear glasses could never be called healthy by this definition.

Secondly, health is not a *state*, if by that is meant something static. On the contrary, health is not static, it is dynamic. It is constantly developing and adjusting. It is that which keeps the body adjusted to normality. Just as gravity prevents a pendulum from swinging too far, health is that which keeps the body and mental processes from wandering too far from their best performance. Health can perhaps be regarded as that which keeps us at the best level of functioning efficiency, both as regards the internal life chemistry of the body, and as regards our work and life in the society in which we find ourselves.

The Healthy Body and Mind

Even if we cannot see, grasp, or measure health, we can at any rate see and recognize a man with a healthy body and mind. The old English expression "hale and hearty" sums it up. It means being whole in body and cheerful in mind.

Here are some of the things that we should find in the healthy man.

1. He should be capable of doing hard physical work without a sense of strain.
2. If, due to extra work, he should become fatigued, he is able to recover quickly with no permanent damage.
3. He is not only capable of work demanding strong muscles, but he is also capable of fine or gentle movements where necessary.
4. All his sense organs function properly. He should be able to see and hear without strain.
5. He is resistant to disease, but if injured by germs or accident, he recovers quickly.
6. His reproductive functions are in working order.
7. Mentally he is at peace with himself and with others. He possesses enthusiasm and courage for life. He is able to use his mind and intelligence for his purposes.
8. Finally, his body eventually shows that it has the ability to continue working for at least seventy years.

The Healthy Community

It is more difficult to study the state of health of a whole people, but one source of information is the statistics given in the *annual reports* of the various government departments. Indeed, the whole object of any government is to increase the total health, happiness and prosperity of the people, and their success or failure in this task is given in the annual reports submitted to parliament or to the Governor.

Here are some of the things we might expect to find in the reports on a healthy community at the present time:

1. Fewer people dying before old age (increased expectation of life).
2. Fewer babies dying in the first year of life (lowered infant mortality rate).
3. Fewer infectious diseases.
4. The commonest causes of death are those due to diseases that are at present not preventable, e.g. cancers, degenerative diseases, and accidents.
5. Agriculture and industry is prosperous because workers work hard, there are few absences and the workers do not have to change their jobs frequently.
6. Education, art and science flourish for the same reason.
7. Life insurance premiums are cheaper.

Hygiene

Hygiene may be defined as the science concerned with the *maintenance* of health. Medical science is concerned chiefly with *restoring* health, which is not quite the same thing. The hygienic aspects of medical science—or the medical aspects of hygiene—are called *preventive medicine*. What a person does to preserve his own health is called *personal hygiene*; what the community does collectively for their mutual benefit is called communal hygiene or *public health*. Health is a "state" of a person or community, hygiene is the activity necessary to preserve that state.

Disease

We can define disease as any state where the body, or part of it, loses its efficiency in performing its functions; where any physiological process has become interfered with in some way.

There is no sharp line separating health from disease. The two states merge into one another. Strictly speaking we ought to insist that a man who has lost one tooth has become diseased. The unity of the body is lost, the body is no longer "whole".

1. *Low Health.* This is a very common condition. Outwardly the man appears perfectly well and carries on his work efficiently. But if his body is subjected to some extra stress, sudden violent work, or if subjected to an invasion of disease germs, its weakness becomes apparent. Similarly, his mind may appear normal until some mental stress comes along, such as disappointment or frustration.

2. *Mild Disease.* People in this category are often able to continue their working lives, but under difficulties. A man may have a weak heart, revealed in his shortness of breath. Another may have a weak chest revealed in a constant cough. Yet another may never seem to have any energy or initiative.

3. *Serious Disease.* Here the person is obviously suffering. He may be in pain, he may be too weak to work, even to stand up. He may need other people to care for him, to nurse him and to see to his wants. He is miserable and unable to think properly.

Factors Influencing the Tendency Towards Health or Disease

We can visualize the body as being continually liable to be dragged off the path of normality by agents of disease, and being continually kept going or rescued by agents of health.

Whether the agents of disease affect the body and whether the agents of health are able to save it depend to some extent on the body's "constitution", its construction, build, make-up, strength and essential qualities. The constitution is inherited from the mother and father.

Our passage through life has often been likened to a river flowing from its source in the peaceful mountains, through calms and rapids, eventually reaching the eternal peace of the ocean. Suppose we think of our body as a boat on the river, and we (ourselves) as the captain. The "constitution" of the boat depends on how it was made at the boat factory. Is it a frail wooden craft, is it a strong iron steamer, is it a crude dug-out canoe? Health is everything that helps the boat along, the oars, the paddles, rudder, sails, or perhaps an engine. The natural current too can help when all else fails. The agents of disease are the rocks, the rapids, the sand-banks, the crocodiles or anything that may hinder the smooth passage of the boat.

With that in mind let us now come on to consider in detail what we mean by these three types of factor: constitution, agents of health and agents of disease.

1. Constitution. We say that a person comes from "good stock" if his mother and father are healthy; they have at least started him off in life with a sound body and mind; he has been given a good constitution. Others are not so fortunate and are born with inherited defects or weaknesses, a part of a limb not functioning, or a low resistance to disease. This is not to be confused with *congenital* diseases, which are caught from the mother before or at birth, or due to birth injuries.

2. Agents of Health (Health Promotive Factors)

(*a*) Firstly, there are the *physiological* requirements, the conditions that a body requires in order to live at all. The study of these requirements is sometimes known as *Personal Hygiene*. Such factors are:

Air, (i) to breathe for oxygen, and (ii) to move over the skin to evaporate sweat.

Water, to drink to replace all that which is lost continually from the body in urine, sweat and breath.

Food. This must consist of the articles of diet needed by the cells.

Sunlight. Most forms of life on earth need sunlight.

Exercise, to keep the body in working order.

Rest, to allow waste products to be got rid of and strength to be regained.

Protection from cold, in the form of clothing or shelter or both.

(*b*) Secondly, there are the conditions surrounding the body, the *environmental factors*. The study of these is called *sanitation*, *public health*, or *communal* and, in some cases, *occupational*, *hygiene*. It is important that none of the surroundings should convey germs to the body from other people, or be of such a nature as to strain or injure the body.

Such factors are:

Shelter, good housing, to protect the body from wet and cold, and to allow family life in privacy and safety.

Cleanliness of the skin and clothes and house, free from germs and parasites.

Cleanliness of *water to drink*, free from dirt and germs.

Cleanliness of *air*, fresh from outside, free from dust germs or fumes.

Cleanliness of *food*, free from germs or parasites, not handled by any dirty person.

Protection from accidents, machinery, electricity, fire, and poisonous fumes, dusts or gases at work.

(*c*) Thirdly, there are the factors which make for *mental health*.

In childhood important for mental health are the love and security of family life, the sense of "belonging". One also needs to feel acceptable to others, that one is part of the social system. The mind needs knowledge, and the intelligence to use it for the benefit of itself, the body and mankind. There should be satisfactory means of employing one's time and earning one's living, with a goal in life that is within our powers and abilities.

Under this heading, too, we must include a satisfactory sex life in marriage, and a happy home circle.

3. Agents of Disease

(*a*) Factors which hinder the body from working efficiently or from *resisting* attacks by disease germs. These are:

Malnutrition: lack of food or the continued use of food lacking in some of the essentials such as proteins and vitamins.

Fatigue: continuous overwork of the body with insufficient rest.

Mental Strain: worry or anxiety which is unrelieved by relaxation or recreation.

Cold: a lowering of the body temperature below that at which it works most efficiently.

(*b*) The arrival of *germs* (bacteria, parasites, fungi) which have caused disease in others. These cause "infectious" diseases.

(*c*) *Physical Injury*. Accidents, industrial poisons, etc.

(*d*) *Mental Stresses*, which cause mental ill-health, such as:

lack of love and security in childhood; unresolved worry or anxiety; over-indulgence in hatred, jealousy, anger, grief, etc.

(*e*) "*High-pressure*" *Living*. Living too fast, trying to do too much, mental and emotional tension, over-eating, alcoholism, lack of sleep. All this tends to wear out the body prematurely.

(*f*) The passage of *time*. However healthily we live, none of us can indefinitely postpone the inevitable senility and death.

Different Kinds of Disease

We can roughly classify the various types of disease that afflict man, as follows:

1. *Nutritional Diseases:* The body as a whole is weakened, and signs of disease appear (see Chapter 3). Examples: scurvy, pellagra, kwashiakor and some kinds of anaemia.

2. *Degenerative Diseases:* These may occur at any time but are especially common in middle age and are probably the commonest of all diseases in modern society, as they are the most difficult to prevent. They are due to the gradual overstrain or misuse of a part of the body. Examples: gastric ulcer, coronary thrombosis (heart attack), high blood pressure, diabetes, rheumatism, obesity.

3. *Growths* (*Tumours*): These occur when the tissues of an organ start to grow by themselves, regardless of the proper shape and function of the organ. Some of them are harmless, such as warts on the skin. Others are harmful and eventually kill. Such growths are called *cancers*.

4. *Allergic Diseases:* These occur only in some people and are caused either by eating a strange food, or by breathing in a strange dust, e.g. eating shellfish or certain types of fruit, breathing pollen or feather dust. What may harm one person may be harmless to others. Examples: asthma, hay fever, urticaria (nettle rash, hives).

5. *Injuries* (*Trauma*): These are the result of some outside physical agent, interfering with the functioning or continuity of the body. Examples: cuts, abrasions, burns, fractures, poisoning.

6. *Industrial Diseases:* (*a*) Poisoning due to chemicals or dusts breathed in (e.g. silicosis, caught in the gold mines), eaten from dirty hands (e.g. lead poisoning), or entering the body through the skin, (*b*) Irritating chemicals on the skin, causing dermatitis.

7. *Psychological Diseases:* These occur when the mind cannot function smoothly or efficiently. There are three main types.

(a) *Mental Deficiency*—lack of brain power. People are born in this state and it is incurable.

(b) *Neurosis*, or *Maladjustment*. Examples: continuous unreasonable anxiety, obsessions, suggestibility (e.g. ability to be bewitched). Neuroses are often accompanied by bodily disorders, lack of appetite, lack of sleep, diarrhoea, etc.

(c) *Insanity* (*Psychosis*). These are more serious mental disorders; depression, mania, feelings of persecution, illusions, hallucinations, desire to kill, etc.

8. *Infectious Diseases:* These are due to the invasion of the body, or the coverings or linings of the body, by germs or parasites. They are sometimes called *inflammatory* diseases, because many of them cause inflammation (pain, swelling redness) where they attack.

Infectious Diseases

Infectious diseases in the past were the most killing of all diseases, and were therefore the most important. Nowadays they no longer kill in such numbers owing to the fact that the discovery of bacteria by Pasteur, and the growth of the science of sanitation in the last hundred years, enables us to keep them in check. But constant vigilance is required. It is the one group of diseases which can effectively be prevented by our own efforts, and is therefore the most important group of diseases. It is the only group we shall study in detail in this book.

Infectious diseases result from invasion of the body of living organisms. These organisms may be of several different kinds:

1. *Bacteria*
2. *Protozoa*
3. *Worms*
4. *Fungi*
5. *Insects*

1. *Bacteria*, sometimes called germs or microbes, are very small unicellular organisms, which can only be seen under the most powerful microscopes. They are classified according to their size and shape: *staphylococci* are like bunches of grapes in shape; *streptococci* are in chains; *bacilli* are rod shaped; *spirochaetes* are corkscrew shaped; *viruses* are too small to be seen by ordinary microscopes.

There are many different species of bacteria in the world. Most of them are not only harmless, but actually beneficial to man. Their function is to cause organic matter (dead animal or plant matter), to rot away. Anything that has lived and has died goes rotten, putrifies, as a result of bacterial action. Some of these bacteria are employed by us, e.g. to make thick milk and cheese; to purify sewage; to make alcohol and carbon dioxide from sugar or flour. (This later process, called fermentation, is done actually by a species of fungi similar to bacteria, namely *yeast*.) It is highly desirable that all dead matter should rot away, otherwise the world would be choked by dead bodies.

But some bacteria seem to prefer the warmth and nourishment they can find on living bodies. We call such organisms, *parasites*. There are many different species of parasitic bacteria. Each species has its own way of attacking the body, and causes effects which are usually typical. These effects we call *infectious disease*. Infectious disease due to one species of bacteria usually differs in detail from that of another species. Hence doctors usually know what type of bacteria are responsible for the particular signs of disease that they see.

Parasitic bacteria normally only live in the bodies of man or animals. To survive and grow they need moisture, warmth, darkness, and nourishing food. Hence most germs die in a few hours if outside the body, especially if there is plenty of daylight. They can multiply however in food such as milk or meat if it is kept warm. Some can survive in water. Some can even survive almost complete drying.

2. *Protozoa*. These are larger than bacteria, but their effects are very similar. There are very few protozoa which cause disease. Some of the commoner of these diseases are: malaria, amoebic dysentery, sleeping sickness.

3. *Worms* (*Helminths*). Some worms are so small that they can only be seen under the microscope, but most can easily be seen by the naked eye. There are three main types: tape worms, flukes and roundworms.

Most have a complicated life cycle, and spend some of their time as a cyst or larva in another animal or insect.

4. *Fungi*. Most of the fungus diseases are diseases of the skin, e.g. ringworm, athlete's foot. One type causes disease in the mouths of babies, namely *thrush*.

5. *Insects*. Insects do not of themselves *cause* disease. They are usually merely the carriers of disease germs. For example flies *carry* dysentery, mosquitoes *carry* malaria. There are, however, one or two types of insect which can themselves cause discomfort. There is the *scabies itch mite* (zoologically speaking it is not an insect but an arachnid or

spider) which causes an irritating rash on the skin, relatively common among children; and there is the *chigger flea* (sand flea) which causes painful holes in the feet.

The *larvae* (worm or grub stage) of some insects live on or in the body as parasites, for example the *tumbu fly*, of the tropics.

Infection by Disease Organisms

Disease organisms, normally speaking, only live in human beings, or animals. The living body is their natural home. They cannot arise *de novo* (out of nothing) due to "bad air", or stagnant water, or anything else. When they invade (infect) a new victim's body they must have come originally from the body of some sick person or animal (there are exceptions to this) suffering from the same kind of disease. Thus, in a person with tuberculosis, the tubercle bacilli (the germs of tuberculosis) must have come from someone or some animal suffering, slightly or seriously, from tuberculosis.

Whether organisms can leave one body and establish themselves on another depends on three factors:

(*a*) A method of spread, a means of getting from one body to the other.

(*b*) The "resistance" of the new victim's body.

(*c*) The "virulence" of the organism.

To illustrate these points we can use an analogy. We can compare it to the process of sowing seed to grow and crop. Indeed germs are literally the seeds of disease. If we want to grow a crop we need three factors:

(i) Somebody to do the *sowing*; either a modern mechanical drill, or perhaps we scatter it by hand, or perhaps the wind and the birds do it for us.

(ii) A *fertile* soil; soil in which the seeds can grow, take root, find moisture and sunshine.

(iii) *Good seed*; seed from vigorous plants, and seed that has not gone mouldy or stale.

It is exactly the same when an infectious disease grows in somebody's body:

(i) There must be some means by which the organism can get from the sick person to the new victim.

(ii) The tissues of the new victim must be in a state in which the organisms can grow and spread (low resistance).

(iii) The organisms themselves must be vigorous (virulent) enough to grow in spite of such defence measures as the tissues may have.

(a) Methods of Spread of Disease Organisms

The various methods of spread of disease organisms are best classified according to the various routes by which they enter the body of the new victim.

Generally speaking, the part of the body infected, which is usually the same in the new victim as in the person who was the source of the disease, is the part one would expect to be reached by the particular route of entry. Thus:

1. Infections of the alimentary tract are caught by eating and drinking the germs (*ingestion*).
2. Infections of the respiratory tract are caught by breathing in the germs (*inhalation*).
3. Infections of the skin are caught by touch or close contact (*contagion*).
4. Infections of the blood are caught when the germs are forced through the skin (*inoculation*).

There are no exact rules about this however. The serious diseases may start as a disease of one part, e.g. the lungs or gut, and spread later to the blood, and so all over the body. This happens with pneumonia, typhoid, meningitis, and other conditions.

Diseases due to the larger parasites will be considered separately, as they do not follow the rule.

1. Ingestion. This applies to germs of diseases of any part of the *alimentary tract*, between the stomach and the anus. (Diseases of the mouth are caught by contagion, see below. Diseases of the pharynx, e.g. tonsils, infected by sore throat or diphtheria, are usually caught by inhalation, though sometimes by ingestion. This one would expect if we remember that the pharynx is at the crossroads of the alimentary and respiratory tract (see Fig. 14, page 69).

Germs of alimentary diseases leave the alimentary tract with the *faeces*. The faeces containing the germs then may get into food or drink in the following ways, and so be taken in by the new victim.

(i) The faeces of the old patient may be washed into a river or dam which is used by the new victim as drinking water.

(ii) When the old patients opens his bowels his fingers may be dirtied. He may then touch food or drink about to be eaten by the new victim. This is especially likely if he is a cook, or works in a food shop.

(iii) Faeces may be carried on the feet or in the gut of flies which alight on the food of the new victim. Cockroaches and lizards may also carry germs from faeces to food.

(iv) The faeces may dry to dust and be blown on to the food or drink of the next victim.

(v) The faeces may be used as manure for the garden before it has been properly made into compost, and so get on to food growing there. Salad foods, and foods eaten uncooked are a most likely source of this danger.

(vi) Nurses and attendants on the sick person may touch his clothes or sheets dirtied by his faeces. They then may put their fingers into their mouths, or touch their food without washing.

(vii) Some animals may suffer from alimentary diseases which affect man, and pass the germs in their faeces; e.g. mice, ducks, pigs and dogs.

(viii) Some persons are said to be “carriers” of disease germs if they have recovered from the disease, and appear quite well, yet still pass the germs with their faeces. It is naturally highly dangerous for such people to work with other people's food and drink.

Examples of diseases spread by ingestion: typhoid (enteric), dysentery, “food poisoning” (diarrhoea), cholera.

Exceptions. (1) *Diarrhoea of Infants.* Germs which are harmless to older children or adults cause this disease in babies. We can say that *all* people are "carriers" of this disease, and anyone can infect a baby if he dirties its food. (2) *Botulism.* This type of food poisoning is due to ordinary rotting bacteria. It occurs especially in home-preserved meat. (3) *Appendicitis.* This is not an infectious disease. It is due to blockage of a little tube-like appendix, which, owing to being blocked, later gets infected with germs that would otherwise be harmless. (4) Indigestion, gastritis, gastric ulcer, constipation, etc., are not infectious diseases, but are due to wrong working of the digestive system.

Rules for the prevention of alimentary diseases spread by ingestion

(i) All faeces must be passed into proper lavatories or latrines, or otherwise safely disposed of (e.g. by burying).

(ii) All persons should wash their hands after opening their bowels. There should always be water and soap supplied near lavatories.

(iii) All persons should wash their hands before eating or drinking, and before handling other people's food, because they never know whether they have touched someone's dirt.

(iv) Food should be protected from flies, and all efforts made to kill flies and to prevent their breeding. Flies breed in rubbish. All rubbish should be burnt, buried or composted at least once a week. (Fly eggs take over a week to hatch and develop.)

(v) Food must be protected from dust, and food that has fallen on the floor should not be picked up and eaten.

(vi) Foods in which disease germs can easily live and multiply should be cooked, and eaten quickly, particularly meat and milk and things made from them. If kept for long, such food must be "preserved" in some way or kept in a cool place. Germs do not multiply in the cold.

(vi) Drinking water drawn from a suspicious place should have all possible germs killed by boiling, or by chemicals, or by a proper filter. The following sources are usually safe: a borehole, or a properly built well, hygienically used; a protected spring; rain-water; municipal taps. Very unsafe are dams, rivers, old shallow wells.

(viii) Places where food is prepared for sale to the public should be inspected by health officials, to see that the workers and their methods are clean. Such places are food factories, food shops, market stalls, butcher's shops or meat stalls, bakeries, cold stores, dairies.

(ix) Persons suffering from infectious alimentary diseases should be placed in an *Isolation Hospital*, so that their faeces cannot harm others.

(x) All persons should be immunized against typhoid (enteric) fever (see page 71).

2. Inhalation. This method of spread applies to germs of diseases of the *respiratory tract*, the nose, throat, bronchi, and lungs. The germs leave the body of the sick person in his breath, and particularly when he coughs or sneezes. The germs float in the air and are breathed in by the new victim. Or they may sink to the ground, and later be stirred up and breathed in with dust.

The germs are sometimes in the slime (mucus, phlegm or *sputum*), coughed up by the patient. If this is spat out on to the ground it will dry and become dust, and may be breathed in by the new victim. *Tuberculosis* is usually caught this way. (Tuberculosis germs may however affect the gut, and from there get into the glands of the neck, and the bones and joints, especially the spine. This is likely if they have been eaten or drunk in meat or milk from tuberculous cattle.)

Examples of diseases spread by inhalation: common cold, sore throat, tonsillitis, diphtheria, pharyngitis, laryngitis (hoarse voice), tracheitis (cold on the chest), bronchitis, pneumonia (inflammation of the lungs), tuberculosis (consumption), pleurisy, whooping cough, meningitis. (Meningitis starts in the nose and later goes to the blood and brain.)

Rules for the prevention of respiratory diseases spread by inhalation

(i) All persons should cover their mouth and nose when sneezing or coughing, preferably with a clean handkerchief. Handkerchiefs should not be used for other purposes, or be waved about in the air. Nose-blowing must only be done into a handkerchief.

(ii) No person should spit except into a proper lavatory, or into a jar of disinfectant. To spit in public is almost as disgusting as to open one's bowels in public.

(iii) Where people are crowded together in cinemas, schools, trains, etc., the air should be cleaned by *ventilation*, that is to say by having windows open, or by other special methods. The clean outside air blows away the germs which might have been breathed out by sick persons and breathed in by a new victim.

At night the windows must be kept open. This is specially important if there is more than one person in the room, but is not good even to breathe one's own stale breath back again.

(iv) All persons should breathe through the nose. The nose filters off some of the dirt and germs in the air. It also warms and moistens the air.

(v) Persons knowing they are suffering from diseases of the respiratory tract should have the decency to stay away from crowded places where they might infect others. Persons suffering from dangerous respiratory diseases such as tuberculosis must be kept away from children, and they must never spit except in a safe place (into a lavatory or jar of disinfectant, or into a box of earth that can be buried safely).

(vi) Children can be saved from catching diphtheria, whooping cough, and tuberculosis, by immunization.

3. Contagion. This is the method of spread of germs of diseases that are spread by close contact between the old patient and the new victim. The contact may be (a) *direct*, as when the bodies actually *touch*, or (b) *indirect*, when there is some *agent* acting as a go-between, such as clothes, bedclothes, and flies. *Examples* of contagious diseases:

(i) *Skin diseases* such as septic sores, "craw-craw", impetigo, scabies, ring-worm.

(ii) *General diseases*, particularly those with skin effects, such as smallpox, chicken-pox, measles, yaws and leprosy.

(iii) *Venereal diseases*, caught from an infected person during sexual intercourse, such as syphilis and gonorrhoea.

(iv) *Mouth diseases*, caught by sharing eating or drinking utensils, or by kissing, such as Vincent's angina, gingivitis (inflammation of the gums), stomatitis (inflammation of the mouth), tonsillitis (inflammation of the tonsils), syphilis of the mouth.

(v) *Contagious diseases carried by flies*, such as trachoma of the eyes, impetigo, septic sores.

Rules for preventing the spread of diseases by contagion

(i) The body and the clothes must be kept clean; the body should be washed all over daily, and the clothes changed at least once a week.

(ii) Never share clothes or bed with strangers.

(iii) Never share spoon, cup, pipe or comb, etc., with strangers.

(iv) Avoid scratching yourself, as the fingernails may contain germs.

(v) In sex life monogamy should be the rule. That is to say, sexual intercourse should be with only *one* other person, for life (i.e. as in marriage).

(vi) Children with infectious skin diseases should be kept out of school. All infected persons should receive prompt treatment.

4. Inoculation. This is the name given to the method of spread whereby the germs are pushed or injected through the skin.

The germs usually get straight into the blood, causing a *generalized* disease of the whole body. There may, however, be first of all a local reaction, giving rise to some sort of *septic sore*, before the germs go on into the blood. These diseases may occur as a result of:

(i) *A bite by a blood-sucking insect.* In these cases the insect must have previously bitten a patient or animal suffering from that disease, before biting the new victim. (If there are no other sufferers that they have bitten, the insects are harmless in themselves.)

Examples: malaria by mosquitoes; yellow fever by mosquitoes; typhus from lice; tick typhus from ticks (this is the only one of these diseases that has a local sore on the skin); relapsing fever from ticks; plague and typhus from rat fleas from rats suffering from these diseases; sleeping sickness from tsetse flies; certain filarial worms from mosquitoes and other biting flies.

Note that each type of insect can usually only carry a particular type of disease, for example, mosquitoes cannot carry typhus.

(ii) *A wound, due to e.g. cut, bullet, thorn.* In this case the wound is said to go "septic". The germs may be from a previously infected person, for example, a person with similar septic sores of the skin, but are sometimes due to the ordinary bacteria of dirt.

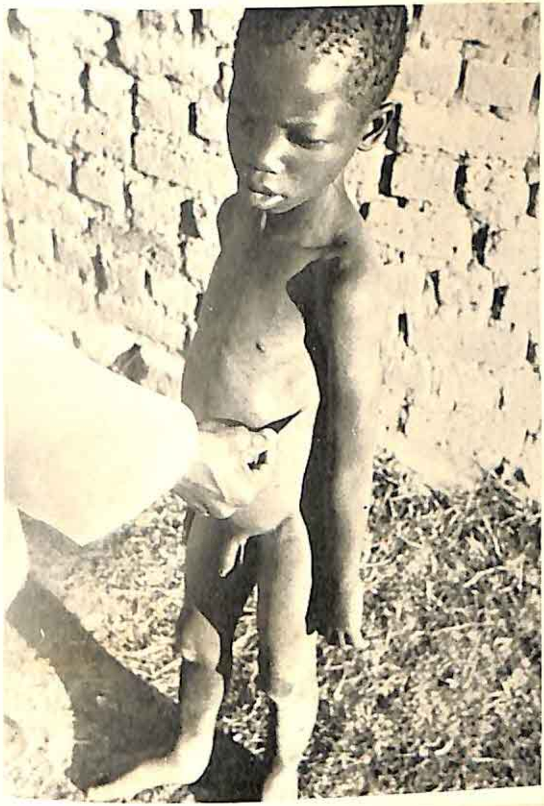
Examples: "Blood poisoning"; here the germs go on from the wound into the blood. Tetanus (lock-jaw): this is due to germs from the earth, not another person, and is therefore an exception to the rule. Tropical ulcers and sores which are usually due to a scratch by a thorn which has previously scratched an infected person.

(iii) *A bite by a dog or wild rodent.* About the only example of a disease caught this way is *rabies* (hydrophobia). The animal himself has the disease. It does not carry it from other humans.

Rules for preventing inoculated diseases

(i) *Insect control.*

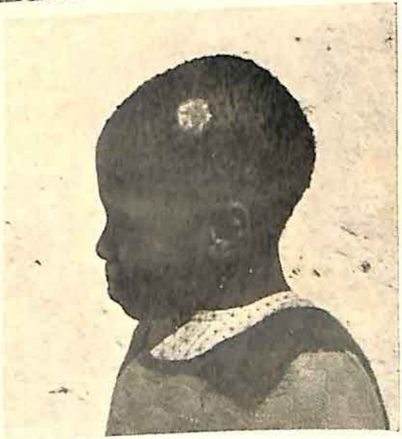
(a) *Mosquitoes.* Prevent mosquito breeding by draining swamps, allowing no stagnant water, spraying breeding



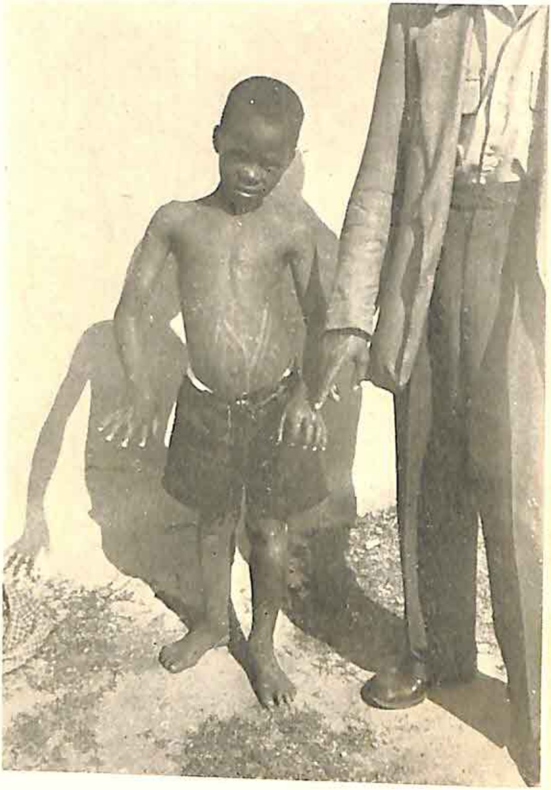
THE THIN DRY SKIN OF MALNUTRITION

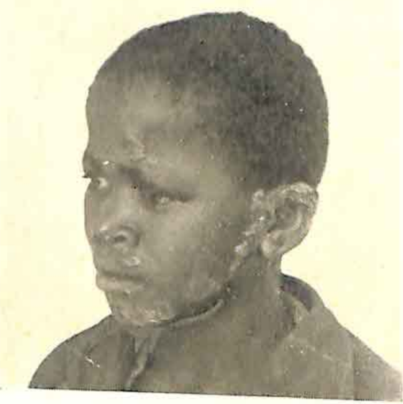
A PATCH OF RINGWORM IN THE HAIR

SEPTIC SORES MAY LOOK SOMETHING LIKE THIS, BUT IT WILL BE SEEN THAT THEY CONTAIN PUS, WHILST RINGWORM IS ALWAYS DRY.



SPOTS BETWEEN THE FINGERS AND SIGNS OF SCRATCHING ON THE ABDOMEN PROBABLY MEAN SCABIES.





IMPETIGO OF THE FACE

places with oil. Kill adult mosquitoes by spraying the insides of houses with D.D.T. Keep mosquitoes from biting you by putting screens on the windows, or by sleeping under a net. (Malaria occurs only in tropical climates. Elsewhere mosquito bites are harmless.)

(b) *Lice*. These insects do not live on persons who keep their clothes and bodies clean.

(c) *Ticks* are reduced by dipping cattle and by clean houses.

(d) *Rat fleas* are reduced by killing rats, and preventing rats from breeding by keeping food in rat-proof places.

(e) *Tsetse flies*. Getting rid of these is difficult but where they are common the Government usually has schemes to control them, particularly by bush clearing and by controlling movements of cattle.

(ii) *Preventing septic wounds*. All wounds should be bathed with an antiseptic which kills germs, such as iodine, Dettol or Cetavlex, and covered with a bandage.

Tetanus can be prevented by immunization.

(iii) *Prevention of Rabies*. Every dog should have a proper owner who takes care of it. Stray dogs should be rounded up and destroyed. Children should be careful not to touch sick dogs or sick veld or bush rodents, in case these animals have rabies.

Diseases due to the Larger Parasites (Helminths). These need a section to themselves as it is not convenient to group them under the headings of ingestion, inhalation, contagion or inoculation. These parasites are all worms of various sorts.

(i) *Tape worm*. This has a complicated life cycle. The adult lives in the gut of man, and lays eggs which pass out with his faeces. If the faeces are eaten by a pig or ox, the eggs hatch and the larvae travel to the flesh where they form *cysts*. These are about the size of a pin's head in the ox, and about the size of a pea in the pig. They are called "*measles*". (Not to be confused with the children's disease of this name.)

If another man eats such measly flesh, especially if it is not thoroughly cooked all through, these larvae grow into fresh worms in his gut, and the man becomes thin and weak.

There is one worm where this process is reversed. The tape worm of the dog has its cyst stage in the ox or sheep, and sometimes man, if the man eats food dirtied by an infected dog. Such cysts can kill the man. They are called *hydatid* cysts.

Prevention of tape worms

(1) All persons should empty their bowels in proper latrines. If this is not possible, they should bury their faeces.

(2) All meat should be killed at a sanitary slaughter-house, and inspected by an inspector to see that it is free from measles.

(3) All meat should be well cooked before being eaten. This kills the tape worm eggs in the meat. Uncooked meat or offal must never be given to dogs.

(Many poor African farmers would not be able to keep pigs if these rules were too strictly enforced, as human faeces is often the main item in the pig food. All we can say is, "If you must keep pigs, do not sell the meat to other people, and see that what you eat yourself is very well cooked." If these people were prevented from keeping pigs they would be deprived of a source of protein in their diet, and if it were the only source this loss might be even worse for their health than the worms.)

(ii) *Round worms*. There are two usual kinds, the large *ascaris*, about the size of a pencil, and the small *thread worm* like little strands of cotton. These live in the gut and lay eggs that are passed out in the faeces. They get on to food or drink in the ways already mentioned under the heading of ingested diseases. Ascaris causes abdominal pain and ill health. The thread worm only occurs in children; it makes them tired and irritable.

Another kind of round worm, the *hook worm*, lives in the gut and lays eggs that hatch out into strong larvae if the faeces are passed on to the ground. These larvae can get through the skin of the new victim if he stands in bare feet or lies on the ground. Hook worms cause the blood to get thin (anaemia), so that the person feels very weak.

In tropical regions there are other round worms, called *filaria*, which are responsible for many kinds of disease.

The largest of these is the *guinea worm*. This lives under the skin of the legs and discharges large quantities of small offspring through the skin if the victim stands in water. After an intermediate stage in the bodies of water fleas the baby worms are ready to infect a new victim should he drink the water unpurified. The worm under the skin dies, and often a large abscess or sore forms at the place.

Very much smaller filarial worms are *wucheria*, *loa-loa*, and *onchocerca*. These live in the blood and are carried to new victims by biting flies and mosquitoes. Wucheria may block the lymphatic system of a limb and so cause the swollen condition known as elephantiasis. The other two types cause nodules in the skin and sometimes damage the eyes causing blindness.

(iii) *Flat worms*. The only one of importance that affects man is the *bilharzia* worm. There is another which affects the livers of sheep and oxen, but rarely harms man, called the liver fluke.

The bilharzia worm lives in the blood vessels of the walls of either the gut or the bladder. The eggs pass out in faeces or urine. If this gets into water the eggs hatch, and the larvae live for a while in water *snails*, where they turn into another and stronger sort of larvae. This second sort is capable of penetrating the skin of the new victim should he bathe or stand in, or drink such water. The larvae grow into the adult form of the worm and travel to the blood vessels of the bladder or rectum. They cause the patient to suffer from ill health. The usual sign of the disease is passing blood in the urine. The disease is therefore sometimes called "human red water disease".

Prevention of Round and Flat Worm Diseases

All faeces to be passed into proper lavatories or buried. No person should urinate in water used by others. Purify all drinking water. Get rid of biting insects.

(b) Resistance

When the body is in a good state of health, resistance is good. The tissues do not form a suitable place for germs to grow, or, if they start to grow, they do not get very far. The "defences" of the body are good when resistance is good. This resistance can be lowered, that is to say the tissues can be rendered more suitable for the growth of germs, or the defences weakened, by the agents of disease, which hinder resistance, listed on page 52, paragraph 3. These are particularly malnutrition, fatigue, worry and cold.

The Defences of the Body. The body is elaborately equipped to prevent the entry of disease organisms, or, if they do get in, to prevent them from spreading and doing too much damage. These defences work best when the body is in a state of good health, that is to say when the resistance is good.

The First Line of Defence

1. *The Skin*. This covers the outer surface of the flesh. It is almost impossible for germs to get through it unless it is damaged in some way (see Inoculation, page 63). The very small germs (viruses) which cause smallpox and chicken pox, can, however, get through it. The natural grease of the skin is slightly disinfectant.

2. *The Mucous Membranes*. These cover the flesh on the inside, by lining the body cavities. These cavities are the gut, the air passages, under the eyelids, the middle ear, the bladder, the urethra, the vagina, and a few others. A germ in these cavities is not in the body proper, not in the *tissues*. Germs have to get into or through the mucous membranes lining these cavities, before the tissues of the body suffer.

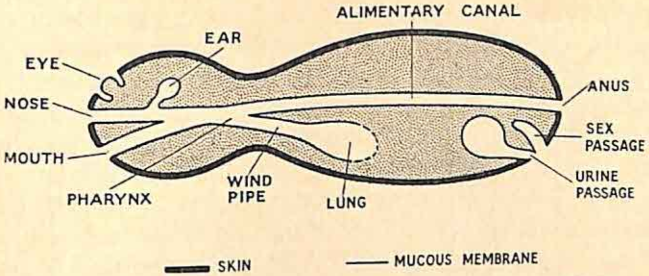


FIG. 14. DIAGRAM TO SHOW HOW THE BODY IS COVERED ON THE OUTSIDE BY SKIN, AND HOW THE INTERNAL CAVITIES ARE LINED BY MUCOUS MEMBRANE

The mucous membranes differ from skin in always being moist and slimy. In some parts, particularly the respiratory tract, there are very fine hairs (*cilia*) on the surface continually sweeping germs towards the exterior.

When mucous membranes are attacked by germs, or irritated by chemicals or dust, they usually react by producing slime (*mucus*). This is seen in the early stages of the common cold, and in dysentery. The intention is to wash away the offending agents.

3. *Disinfecting Fluids*. The tears of the eyes, and the juices of the stomach can kill ordinary germs if they are not too virulent.

4. *Germ-catching Tissues*. These are sponge-like lymph tissues. Some are placed at the entrance to the pharynx—the *tonsils*. Some are behind the nasal cavity—the *adenoids*. Some are in the gut.

The Second Line of Defence

If the germs should get either into or through the skin or mucous membranes the tissues react violently. This is called an "*inflammatory reaction*", because the place appears to be on fire. It is red, hot, swollen and painful. If the skin or mucous membrane is destroyed a sore (*ulcer*) is formed If the sore is under the skin or mucous membrane, and is completely covered, it is called an *abscess*. A *boil* is a very small abscess.

If you looked at the sore place under the microscope you would see that there is (i) an increased amount of blood flowing through the tissues there; (ii) the blood *serum* is flowing out into the tissues between the cells; (iii) white blood cells are leaving the blood and are collecting between the tissue cells. Disinfectants in the blood (*antibodies*)—if there are any—are in the serum and kill the germs if possible. The white cells are like amoebae and eat the germs, but often the germs overcome the white cells first. So there is a mixture of serum, living and dead white blood cells, living and dead germs. This is called *pus*.

In order for a cure to take place the pus must flow on to the *outside* of the body or into a body cavity. Sometimes it may be necessary for a surgeon to hasten this by cutting a hole.

Where the sore place is in or near mucous membranes, the tissues produce a good deal of mucus mixed with pus and sometimes blood. The spit of bronchitis or tuberculosis is mucus and pus like this. It is also seen in the late stages of the common cold, in gonorrhoea, in dysentery, and many other diseases.

The Third Line of Defence

At the place where each limb joins the body, the groins and armpits, are groups of *lymph glands*. There are similar glands at the root of all organs such as the lungs and the liver, and all along the gut. These act as filters to catch the germs if the limb or organ is affected. When the glands are doing such work, they are usually enlarged and tender.

Enlarged glands are commonly seen in the necks of children suffering from tuberculosis of the lungs or gut. Most people can remember having had painful glands in the groin following an injury to the leg.

Enlarged glands in animals are especially useful signs to meat inspectors, for they know that if the glands of a part are enlarged, say the liver, then that part must be diseased and is unfit to eat.

The Fourth Line of Defence

If the germs get through the first three defences, they get into the blood and are carried all over the body. (This happens straight away in some diseases, for example malaria.) This is what is called a *generalized* disease, and there is a generalized reaction. The patient feels weak and unable to stand. His heart beats fast and the temperature of his body rises, though he may actually feel chilly. There may be headache, and usually the bowels do not work (constipation).

The number of white cells in the blood usually increases, and in the *serum* of the blood there forms a special disinfecting substance to counteract the germs. These disinfecting substances are called *antitoxins* or *antibodies*. They differ from ordinary chemical disinfectants in that they will only act against the particular species of bacteria that was attacking the body when they formed. Their action is said to be "specific". Thus the antibodies for typhoid germs are no good against typhus germs. The presence of these substances in the serum is called *immunity*.

In some diseases these disinfecting substances remain in the serum for only a few days, just long enough to cure the patient if possible. In other cases they last a lifetime. For example, if you have had an attack of smallpox germs, and survive, you need never fear another. You are said to be immune. On the other hand, if you have had an attack of influenza, or pneumonia, you may well get another soon afterwards.

Immunity due to past disease is said to be *natural acquired immunity*. We are also born with some natural immunity, inherited immunity. For example, human beings are immune to dog distemper, or Newcastle disease of chickens.

Luckily for us, and thanks to the discoveries of Jenner and Pasteur, immunity to some diseases can be conferred on us *artificially*, by a suitable injection of dead or weakened germs of the particular species we wish to be protected against. Some of the diseases we can be saved from in this way are: smallpox, diphtheria, typhoid (enteric), plague, tetanus, whooping cough, and yellow fever.

In some cases real disease germs may have got into a body but have not yet had time to "incubate", to cause signs of the disease. That is to say, in a person who has been in "contact" with an infectious case. In such people there is still time to stimulate immunity artificially and so get the body ready for the attack when it comes. Suitable diseases for this are: smallpox, typhus, whooping cough, typhoid (enteric).

Sometimes doctors use *serum* as a medicine to cure persons suffering from particular diseases. The serum is obtained from horses or other persons who have been immunized artificially or naturally against the same disease. Serum can be used in the following diseases (among others): diphtheria, scarlet fever, measles, mumps, tetanus, anthrax. Snake bite is also treated this way.

Generally speaking, immunity is best against bacteria, poor against protozoa, and almost absent against worms and fungi.

Thus we see that in the word resistance are included two main factors: (i) the ability of the natural defences of the body to withstand attack, and (ii) the "immunological state" of blood with regard to the particular disease in question. Both these factors depend on the good health of the whole body if they are to work well.

(c) Virulence of Germs

The germs of some diseases seem to be able to invade the body whatever the general resistance is like (unless there is a specific immunity against them). They are said to be very *virulent*. For example, no amount of health or nourishment will protect a non-immune man from such diseases as smallpox or malaria.

On the other hand, there are germs of other types of disease that never get a foothold unless the resistance is very low. They have a poor "invasive power". Such diseases are pneumonia, tuberculosis, leprosy, boils. Healthy people usually need not fear such germs.

Some diseases seem to produce virulent germs on some occasions and mild germs on others. For example, smallpox sometimes occurs in mild form, and so do diphtheria, ordinary meningitis and yellow fever.

Sometimes scientists deliberately make germs less virulent, to use them as immunizing agents. This is done for example, in the case of smallpox, tuberculosis, yellow fever, and other diseases.

Ways of Killing Germs

Since germs are the agents which cause many diseases, it is very desirable that we should be able to kill them before they ever enter the body.

The agents for killing germs are usually called disinfecting agents or sterilizing agents. They are:

1. Certain chemicals, called antiseptics or disinfectants.
2. Heat (over 64° C., 150° F.).
3. Light, especially sunlight and ultraviolet light.
4. Filtration—filtering off the germs.
5. Pressure.

The particular method used depends on the kind of thing or place which one wishes to render free from germs (to clean, purify or sterilize).

Water. To make water safe for drinking there are several methods.

On a small scale it is simplest just to bring the water to the boil. Household filters are also available.

On a large scale the water is first filtered through sand, and then chlorine is added as a chemical disinfectant.

Milk. Heating to over 64° C. (150° F.) kills all disease germs without spoiling the taste. This is called "pasteurization". It is simpler, however, to boil the milk.

When milk is allowed to go thick, typhoid, dysentery and probably tuberculosis germs are usually killed by the beneficial souring bacteria.

Other foods, such as meat, are sterilized by cooking.

Air. We do not usually bother to purify air. It is simpler to get in a fresh supply from outside, as there is plenty of it. In mines, submarines, and city offices, air is sometimes sterilized by ultra-violet light.

Hands and Skin. Soap and water are sufficient for ordinary purposes. If the hands have definitely touched disease germs an antiseptic such as Dettol or Pinex may be added, in quantities according to instructions on the bottle.

Soiled clothes or bedclothes. These may first be soaked in water containing a little Dip (Cresol) or Lysol, or they can be boiled. On a large scale, e.g. in Public Health Departments and hospitals, steam under pressure is used.

Floors, furniture, utensils. These are washed in water containing a little Dip or Lysol.

Wounds. A little iodine solution (tincture of iodine), flavine solution, cetramide (Cetavlon) or various other lotions are suitable.

Septic sores. Antiseptic healing ointments of various kinds are available. "Blue paint" is commonly used. (See Chapter 9.)

The Signs of Disease

1. *The Effects of Germs on the Body*

The effects that are noticed depend very much on the part of the body and the kind of germ, but generally speaking we can say that:

(*a*) When the *skin* is infected, the signs of inflammation appear, namely pain, swelling, heat and redness. Later pus may appear, and sore places. These signs are seen typically in abscesses and septic sores.

(*b*) When the internal *mucous membranes* are infected, slime is discharged from the particular cavity concerned. The slime is at first watery; later it may be thicker, contain pus, or be bloodstained. These signs are seen typically in such diseases as food poisoning (diarrhoea), bronchitis, gonorrhoea, etc.

2. *The Typical Effects of Damage to the Various Systems*

The Alimentary System. Diarrhoea, sometimes blood and slime; abdominal pain (colic); vomiting; constipation plus vomiting.

The Respiratory System. Discharge of slime (catarrh); cough with spit, sometimes bloodstained spit; pain in the chest; difficulty with breathing.

The Circulatory System. Shortness of breath; swelling of the body (dropsy).

The Musculo-Skeletal System. Pain or stiffness on moving.

The Nervous System. (a) *Nerves.* Inability to move a part of the body (paralysis), loss of feeling in a part of the body. (b) *Brain.* Severe headaches, sometimes vomiting, convulsions, stiff neck, unconsciousness. (c) *Mind.* Disorder of thought or behaviour.

The Reproductive System. Sores or discharge from the sex organs. In women, menstrual disorders. Inability to have children (infertility).

The Excretory System. More frequent emptying of bladder, sometimes pain or "scalding" when passing water.

Helping the Sick Body to Combat Infection

1. *General.*

(*a*) The body should be *rested.* That is to say the sick person should lie in bed. In serious illness, like tuberculosis, he should at first not get up even to open his bowels or pass water. Suitable vessels should be provided by the person nursing him.

(*b*) The tissues must be well *nourished.* That is to say the patient must be given plenty of the protective foods, especially protein and vitamins. This means meat—especially liver and kidney—milk and eggs. Also vitamins as in fruit and fruit juice, yellow vegetables and fish oil. Very sick persons are usually given chicken broth, beef tea, Oxo, or Marmite to drink. (See Chapter 3.)

(*c*) Wash the poisons out of the *blood*. That is to say, give him lots of water to drink, at least six pints a day in hot weather. Tea and soup are good too.

(*d*) Keep the patient's *mental* state good. That is to say, keep him cheerful, and optimistic about his cure. But do not overtire him with too many cheerful visitors.

2. *Local.* If germs are attacking a particular part of the body, the inflammatory reaction can sometimes be assisted and the cure hastened by:

(*a*) The application of *heat*, such as a poultice, or hot bathing.

(*b*) The application of warming *lotions* or liniments, e.g. camphorated oil on the chest.

(*c*) *Antiseptic* lotions or ointments, such as iodine or healing ointment.

(*d*) The part should be *rested* as much as possible. For example, doctors sometimes rest a tuberculous lung by "collapsing" it (artificial pneumo-thorax).

Medical Treatment of Disease

Only treatment advised by a properly qualified doctor is safe.

1. *Medicines.* These are of three kinds. They may be given by mouth, or by injection:

(*a*) To make *symptoms* better. Such are medicines which say soothe a cough, stop diarrhoea, cure a headache, etc. They make the patient *feel* better, but do not necessarily cure or get rid of the *cause* of the disease.

(*b*) To improve bodily *function*. Such are medicines which cause sweating, start the bowels working (laxatives), improve the "tone", i.e. strength, of the body (tonics).

(*c*) To kill *germs*. These are medicines like sulphonamide ("M and B"), and penicillin. Naturally they can only be used for diseases caused by germs, and by no means all of those.

2. *Surgery*. It is sometimes necessary to remove a diseased part, to cut it out, in the same way that diseased teeth must be pulled out. Where pus has formed it should be let out by the surgeon. The treatment of injuries and deformities is included in surgery.

How a Doctor Works. The doctor's duty is (*a*) to find out what is wrong with the patient, and then (*b*) to advise the necessary treatment.

The doctor finds out what is wrong, not by guessing, not by any mystery or magic, but by scientific deduction from the information available.

This information is of three sorts: (*a*) what the patient tells him, (*b*) what he notices himself, and (*c*) information obtained by special examinations of diseased material in the laboratory (blood, pus, urine, etc.), or by X-ray or other special methods.

The more information the doctor has, the more likely will he be to find out the cause of the disease correctly. Therefore, patients should tell the doctors all they know about their illness, both at present and in the past, and answer his questions freely. They should also allow him to take specimens of blood, or whatever else he wants.

In many cases, of course, the doctor can see at a glance what is wrong with the patient, and no further information is necessary.

A good doctor is one who:

(*a*) Asks questions.

(*b*) Examines the patient carefully.

(*c*) Is polite and gentle.

(*d*) Explains the nature of the disease, and, if possible, how it can be prevented.

(*e*) Explains how he intends to treat it.

What to tell a doctor about a sick person. Sometimes, in some parts of Africa, the doctor is far away and the patient is too ill to go to him. A friend then goes to the doctor to bring back medicines. This is not desirable, and no doctor likes to prescribe medicines by hearsay, but sometimes it cannot be avoided.

The doctor will want to know:

(*a*) How long has the patient been ill?

(*b*) What did he feel, then and now?

(*c*) Is there pain? If so, where?

(*d*) What is the breathing like? Is he coughing? What does he cough up?

(*e*) Is he vomiting? Are his bowels closed, or opening too often? What are the motions like?

(*f*) Is there anything to see? Spots, swellings?

(*g*) Is there any fever? If possible the temperature should be taken and the pulse rate counted.

Social Aspects of Hygiene (Public Health or Community Hygiene)

We have seen that most of the serious infectious diseases are spread by germs travelling from sick persons (or sometimes from sick animals) to healthy people. Every person has a double duty:

(i) To protect himself from the germs of others.

(ii) To do nothing which might cause germs from himself to spread to other people.

It is obvious that when people, or families, live by themselves apart from other people they need not do much in this connection. But most human beings are in daily contact with others, we are constantly meeting other people, we drink the same water, eat the same food, congregate together in the same buildings. These two duties are in such circumstances much more important. So important are they that the people, through their government, put as many as possible of these duties in the form of laws that everybody must obey. Most people obey these laws not because they *must*, but because it is the decent thing to do.

In most communities public health work is organized by the *local* (municipal or district) councils. A Medical Officer is put in charge (usually called the Medical Officer of Health, or M.O.H.), and he may have a staff of trained health inspectors and health visitors (public health nurses) to assist him. The laws, though made by the local council, must be approved by the Central Government (Minister of Health). The local officers:

(i) see that the laws are carried out,
(ii) carry out actions to safeguard health, and
(iii) try to improve the health of the people.

Some of the money to pay for these services is usually raised locally by a tax on property owners (rates). The rest is provided by Government grants.

In rural areas, the Central Government is usually in charge of public health work, and there is no local charge, the cost being paid from central taxes.

1. *Laws* (*Regulations*) *of Public Health*. The following are some typical public health regulations. There are many others. Some of them are applicable only in towns.

(1) Faeces and excreta must be deposited hygienically, so that there is no risk of it fouling other people's food or drink.

(2) Rubbish must be deposited in such a way that it does not breed flies or cause offensive smells.

(3) No food may be sold that has been prepared in a dirty manner (this applies especially to milk, ice-cream and meat).

(4) No meat may be sold or slaughtered unless inspected by the health officer.

(5) Persons suffering from certain infectious diseases must be kept in isolation (either at home or in hospital as the M.O.H. may decide).

(6) Very dirty or verminous persons can be ordered to be cleansed.

(7) The occurrence of certain infectious diseases must be "notified" to the M.O.H. by the head of the family or village. Where there is a doctor attending he usually does it himself.

(8) Users of public buildings (such as cinemas or churches) must see that they are properly ventilated.

(9) Owners of houses let to other people must see that they are "fit for habitation", i.e. large enough, not damp, provided with water nearby, lavatories, cooking places, etc.

(10) All births and deaths must be reported to the authorities.

(11) All dogs to be licensed (this discourages rabies).

2. *Some Activities which the Public Health Authority carries out to Safeguard Health.*

(1) The Health Inspectors examine food, especially meat and milk, to see that it carries no germs.

(2) The Municipality provides safe drinking water.

(3) The Municipality provides the safe disposal of sewage and rubbish.

(4) The Medical Officers in some areas immunize free of charge all people who wish it against diphtheria, whooping cough and typhoid fever. The immunization against smallpox (vaccination) is also provided, and is compulsory.

(5) The Health Authority provides isolation hospitals, T.B. hospitals, leper asylums, etc.

(6) The Health Authority in malarious areas deals with water where mosquitoes and other harmful insects might breed, and sprays the inside of huts where they might hide.

(7) Factory Inspectors see that in factories the machinery is safe, and that there are no poisonous or other harmful substances about.

3. *Some of the Ways in which Health Authorities try to Improve the Health of the People.*

(1) Maternity Services may be provided, with the idea of preventing damage or death to mother and child. There are usually ante-natal clinics, midwifery services, a maternity hospital, and post-natal clinics. (These services are provided by the larger Municipalities.)

(2) Infant Welfare Clinics may be provided where the health of young children is supervised, and where mothers are instructed in mothercraft. (These are often run by voluntary societies.)

(3) School Health Services may be provided to supervise the health of school children, and to advise teachers on their educability.

(4) General hospitals for the treatment of the sick may be provided.

(5) District medical officers or dispensers may treat the sick poor free of charge. Their salaries are paid by the Central Government.

4. *Welfare Activities of the Government.*

This concerns itself with providing financial aid and other assistance to the blind, crippled, permanently disabled, widows, orphans, aged persons and the destitute poor.

In some countries there are contributory insurance schemes which pay "sick benefit" (a proportion of the wages) to sick bread-winners, and workmen permanently disabled by industrial disease or accident receive financial "compensation" taken by the Government from a fund contributed to by employers. "Rehabilitation" of injured workmen, retraining them for other jobs, may be undertaken by the Labour Department.

5. *Private Organizations concerned with Health.*

(1) Private doctors.

(2) Private chemists.

(3) Private hospitals and clinics. These are often financed by church organizations or by voluntary societies such as the Red Cross. Many industries run their own hospitals and medical services.

(4) Insurance companies. These undertake to pay for the expenses of treatment by private doctors or to compensate the sufferer for loss of earning power.

6. *Voluntary Societies concerned with Health.*

Governmental agencies cannot possibly deal with all social and health problems, nor is it desirable that they should do so. Some freedom and initiative must be left to the people themselves. We usually find that any small gaps in the official services are filled by voluntary societies. Voluntary societies are of several kinds, such as:

(1) Charitable organizations to help poor people in time of trouble. Many of the churches run societies of this sort.

(2) Organizations to provide special care for particular types of sufferers. There may be societies for the care of cripples, which provide splints and retraining facilities; tuberculosis societies to provide extra nourishment for the sufferers; societies to provide extra facilities for blind people; mental health societies to help those who are too mentally disabled to help themselves.

(3) Organizations concerned with health education.

(4) Organizations concerned with the health of the rising generation, such as child welfare societies which teach mothers how to look after babies, or youth clubs which cater for the excess energies of young people.

(5) Adult education societies. These may include domestic science, home nursing, etc., in their activities.

(6) First-aid societies. The best known of these are the Red Cross and St. John's Ambulance Societies. They hold examinations and give certificates to those trained in first-aid.

It is the duty of all educated people to join a society, such as one of the above, or a society engaged in some socially useful work. By helping in this way we are serving humanity, and helping to increase the sum total of human happiness on this earth.

Voluntary societies often pave the way for government action to follow. They can undertake work that is needed but which the Government has not budgeted for. When they prove the usefulness of the scheme the Government may either help with funds or take over the work.

7. *Community Development.*

In some rural areas, particularly in countries where the people are not yet rich enough to be taxed to provide money for government schemes, the people have to be taught to undertake elementary sanitation schemes themselves with no financial assistance. Such schemes are usually combined with adult education schemes, agricultural improvement schemes, village industry schemes, etc., the whole being known as *community development*.

Health schemes that the people can undertake themselves, with guidance, are: provision of latrines, provision of simple safe water supplies, better housing conditions, draining or oiling of surface water, disposal of rubbish, general cleanliness of home and village.

The central government may say, "If you do all this we will do what we can to provide clinics, qualified staff, immunizations, and other more specialized and expensive public health requirements."

8. *International Agencies.*

Under the United Nations, governments of the more progressive nations combine together to help countries that are not so rich or highly developed. Teams of experts are sent to advise on problems; education of the local people and training of local professional workers is encouraged, and in some cases food and medical supplies are provided. They always work through the government of the country being helped. This is called "technical assistance".

Some of these organizations are:

World Health Organization (W.H.O.), concerned with health problems. (Headquarters: Geneva.)

United Nations Educational, Scientific and Cultural Organization (U.N.E.S.C.O.), concerned with education and training. (Headquarters: Paris.)

Food and Agriculture Organization (F.A.O.), concerned with improving food supplies. (Headquarters: Rome).

United Nations Children's Fund (U.N.I.C.E.F.), concerned with child welfare schemes. (Headquarters: New York.)

International Labour Organization (I.L.O.), concerned with conditions under which people work, including health problems affecting workers. (Headquarters: Geneva.)

Chapter Three

FOOD AND EATING

There is no need to stress the importance of food. We all know that we cannot survive long without food. Almost all animals, and many of the less developed human races, spend the whole of their waking life in search of food. Even in our present-day world the production and distribution of food is undoubtedly the most important of the divisions of labour.

Not unnaturally, the eating of food has taken on important cultural and social aspects. Food is not taken casually all day as by animals, but at special meal-times, where the family gathers together and observes certain customs of behaviour and etiquette. When we want to celebrate we invite our friends to a special meal. The killing and eating of highly valued animals is part of the religion of almost all peoples of the world.

The Science of Nutrition

We all know, many of us only too well from experience, that food is necessary. But what is surprising is that so few people bother to understand the elementary principles of so vital a matter. Most people simply follow blindly what custom, or their own tastes, tell them. What so many people do not realize is that among the many different kinds of food some are more beneficial than others. It is not the *amount* of food we eat that is most important, but the *kind* of food. There are many different kinds of food, but scientists have classified them into a few main groups, according to the kind of chemical substances they are made of. The study of foods and their importance is called *nutrition* or *dietetics*.

Kinds of Food

1. Protein. The protein kind of foods all contain certain forms of *nitrogen*. Protein is the most important kind of food because we ourselves are made almost entirely of protein. A child, from the day he is born, until he is fully grown, has to *build* his body of protein. But the body cannot make its own protein on the spot, out of other kinds of food, any more than a man building a house can make bricks out of wood. All the protein has to be taken in with the food. That might be simple enough, but the body is not only built of protein but *works* on protein. Protein is the very stuff of which the chemical process which we call life is made. Even plants, in their essential parts, especially the seeds, have some protein in them.

It is easy to see then that protein is of great importance to children if they are to grow. Before birth, the child in the womb depends for its growth on the protein of its mother's body. As a baby it gets plenty of protein if there is sufficient milk, and good mothers see that those children no longer sucking are given enough protein with their food.

For adults, protein is still necessary to keep the body's physiological processes working properly. Protein keeps muscles strong, the heart vigorous, the brain active, and the lungs elastic. Protein is used to repair the tissues that are continually being worn out, because the individual cells of which our bodies are made do not last as long as we ourselves do, especially if not well fed. Protein is also essential for the proper working of the *defences* of the body. The skin and mucous membranes depend on plenty of protein so that they can keep out germs. The white blood cells, and the disinfectant antibodies in the blood, are all made of protein. Wounds heal quicker in people who are given plenty of protein. For these reasons sick persons, especially those suffering from infections caused by germs, are usually advised to have plenty of protein to eat or drink.

Protein, in a word, is essential for growth, health and efficiency.

Sources of Protein. Where do we find this wonderful stuff called protein? Since all animals are made of protein, the foods richest in protein are those obtained from animals. This means all kinds of *meat*, including *fish*, and *eggs*, and *milk*. Of the meats the richest part is the liver, especially if not cooked too much.

Vegetables also contain a small quantity of protein, but what there is, is not so valuable. Scientists call it "second-class protein". There is hardly any protein in mealies (corn or maize) and very little in white bread. The best sources are peas, beans, lentils, soya beans, and groundnuts (peanuts). Notice that all these foods are made of seeds, though in the case of white bread much of the seed is lost. Almost any kind of *whole* seed contains at least *some* protein. It is put there to nourish the seedling when it grows.

How much protein does the body need? One thousandth part of the weight of the body per day is said to be the least that is required for health. That is to say a girl weighing 100 lb. would need at least about 1½ ounces of protein a day. The reader will have to consult larger textbooks if he wants to work this out in terms of milk or meat or beans or bread. Remember that only a quarter of meat is protein—the rest is mostly water—and dry beans contain only about one-tenth of protein.

Lack of protein does not cause any particular disease. It simply lowers health, strength and vigour, and probably shortens life. In small children, those recently weaned, lack of protein is a common cause of malnutrition and death. Small babies getting insufficient milk easily catch diseases such as diarrhoea or bronchitis, which are often fatal.

2. Carbohydrate. These foods are made of carbon, hydrogen and oxygen. There are many kinds but the commonest are cellulose, starch and sugar. Alcohol is also a carbohydrate.

Cellulose. Wood and straw are made of cellulose, but it is found in smaller quantities in all fruit, and leaf or root vegetables. Cellulose cannot be digested by man or carnivorous animals, but in man it is essential to the diet to provide "roughage" which the bowels can pass out.

Starch is the commonest of all foods. It all comes from plants, and is the part of the plant used for storing food in concentrated form for the use of its offspring. Seeds, especially grain cereals such as maize (mealies, corn), wheat, rice, sago, etc., and roots and tubers, such as potatoes, yams, cassava, contain starch in large quantities.

Starch is fairly indigestible because it is contained inside cellulose cells. Humans can only digest it properly if it is milled or ground, or cooked. Thus this important source of food was not fully used by the human race until it had at least discovered fire and other arts. When it was found that large quantities of starch could be obtained by growing cereals then the human race began to move forward. This probably happened when the ancient Egyptians first grew barley in the flood lands of the Nile.

Thus starch is not a natural food for man. It is conveniently concentrated and can easily be stored, but it should only be used to supplement natural food like meat, fruit and vegetables.

In its natural state, starch has to be converted to sugar (malt) by the action of water and warmth for it to be of use to the young plant. Man should imitate this process too. Thus maize, oats, peas and beans are soaked in warm water overnight before cooking. In the case of wheat flour, yeast is added too, to make it less dense and more palatable for bread or cake.

The fermentation of foods, as for example in sour porridge, has a similar effect and is also nutritionally a good practice.

The soaking or fermentation of seed foods causes the formation of vitamins, i.e. it brings life into the dormant starch.

Digestive juices in the stomach and gut turn starch into *sugar*, which is then absorbed into the blood and liver for use.

Sugar does not occur commonly in nature, and our forefathers presumably had little of it. It is found in the sugar cane, in fruit, in sprouting seeds, and in honey. Honey, of course, is collected from flowers by bees.

Carbohydrate is used by the body as fuel. It is what is used to drive the engines of our body, as it were. It is therefore particularly needed by hard manual workers and athletes. It is also very necessary for growing children, not to make them grow, but because they are so active. If it is eaten in large quantities by other persons, however, it is simply turned into fat and deposited under the skin, thus giving the poor body extra weight to carry about (obesity).

It is often said in books on hygiene that carbohydrates provide "energy". The word energy is used in such books in the sense used by persons studying physics, energy being a general name for heat, motion, light, electricity, etc. But carbohydrate does not provide energy in the everyday sense of the word. It does not make you more "energetic", vigorous or active; on the contrary too much carbohydrate makes one slothful. Protein is more likely to supply this sort of energy. If we think of carbohydrate as the coal in a railway engine's fire, the burning coal makes the engine move, but, after a certain point, adding more and more coal will not make the engine go faster and faster. It is the size and stroke of the piston, the construction of the engine, which determines its speed. So it is with our bodies.

How much carbohydrate should one eat? There is no exact answer to this, as different people require very different amounts, depending on the rate at which they are using their bodies. But roughly we can say that, for an adult person about normal weight who is living a regular life and suffering from no disease, if his weight is increasing, he is eating too much carbohydrate; if his weight is decreasing he is eating too little This is one reason why persons should weigh themselves regularly, say once every few months.

3. Fat. This is the third type of foodstuff. It is found in animal's meat, and milk contains a great deal of it which is often separated off as cream or butter. Egg-yolk is rich in fat, and it is found in fish, especially in their livers. It is also found in many types of vegetables, especially nuts, such as the groundnut (pea-nut butter), the coconut (palm oil or frying oil), the olive (olive oil), sesame seed, etc. Chocolate contains a lot of fat. Margarine is made usually of a mixture of whale or beef fat and palm oil. The vegetable types of fat are just as nutritious as the animal types, but contain less vitamin D.

Fat is used to some extent for building tissues, especially brain and nerves, but for the most part it can be regarded as having the same use as carbohydrates. It is a fuel and supplies "energy" in the same way that carbohydrate does. Its advantage is that it is "stronger". People in winter find that fat warms their bodies more quickly.

Fat from the food, or fat made by the body out of carbohydrate, is *stored* by the body as a reserve in case of famine. This is seen in many types of animals, such as cattle who depend on the weather and must risk droughts, and in the hibernating animals of North America, such as beavers or bears, who store up enough fat in their bodies to enable them to sleep all the winter. Some human races do much the same thing, particularly the Hottentots and Bushmen. In our modern world, where most of us can be sure of eating every day, this habit of the body is more of a disadvantage than an advantage. In older people excessive fat (obesity) can weaken the heart and arteries.

Animal fat is also an important carrier of vitamin D, which will be mentioned later.

Children, hard manual workers, and nursing mothers, need more fat than other people.

4. Minerals. These are the various chemicals—those readers who have studied chemistry will recognize them as *inorganic* chemicals—which go towards the building and working of the body.

Calcium is important for building bones, and it is an important intermediary in all the chemistry of life.

Calcium is found chiefly in milk, and to a lesser extent in vegetables. It is required particularly by pregnant and nursing mothers and by children.

Phosphorus is another mineral required by bones. It is found in eggs and seed foods.

Iron is essential for the blood. Without iron the blood is thin (anaemia), and will not carry oxygen properly. Iron is found in green vegetables and red meats, and there is a little in whole seeds and nuts. It is especially important for girls and women, or persons who have lost blood from a wound or disease.

People who cook their food in iron pots get plenty of iron in their food, and rarely suffer from this form of anaemia.

Iodine is required in very small quantities to keep the thyroid gland healthy, and *Fluorine* is required in very small quantities to keep the enamel of the teeth healthy. Both these substances occur naturally in most parts of the world and we get them in our food in any case. Where they do not occur the authorities should add them to the drinking water. Some kinds of table salt contain them.

Sodium Chloride is the chemical name for table salt. Small quantities of this are necessary for life's chemistry. In hot weather more should be taken to counteract that which is lost in the sweat. Lack of salt causes a feeling of weakness, but too much damages the blood.

5. Vitamins. This is a group of foods which are important for health, but which are needed only in very small quantities. They usually occur along with other foods. If we eat *natural* foods, the kinds that our forefathers ate, we would probably get enough vitamins without having to think about it. Vitamins occur in meat, fruit, nuts, fresh vegetables, seeds and grains, and in fats and oils. Generally speaking, the best of them do not occur in artificial foods like white samp (crushed corn) or white flour (milled, refined), nor in foods cooked too much, nor in foods preserved by salt or in tinned food.

Vitamin A. This vitamin occurs in the green or yellow parts of vegetables such as spinach, carrots and pumpkins, and in yellow seeds such as mealies, also in meat, milk and eggs, and in fish liver oil. It is not easily spoilt by cooking.

Vitamin A is important for enabling children to grow. It also helps to keep the eyes healthy. Persons lacking this vitamin cannot see well at night.

Vitamin B. There are many different types of vitamin B. Most of them occur in the embryo (baby plant) part of seeds. They are also found in vegetables, meat and milk, and African beer. White bread, white samp (stamped maize, corn), white rice and cassava do not contain these vitamins, and people living on such foods develop certain diseases. The typical disease in Africa due to eating these carbohydrates with not much else in addition, is called *pellagra*. It affects the skin and mucous membranes. The eyes, tongue and lips, the bowels and the mind are often damaged too (see page 201).

Yeast and Marmite contain much Vitamin B and are used for preventing and treating pellagra.

Vitamin C. This is found in the fresh juice of fruits, vegetables and green plants. It may be almost completely destroyed when these foods are cooked or preserved.

Lack of vitamin C weakens the blood, allows infection by germs, and slows the healing of wounds. In severe cases it causes the disease called *scurvy*, formerly common among sailors when they were at sea for more than a few months at a time, when they had to live on things like biscuits only, and no fresh fruit or vegetables. In this disease the gums, and other parts of the body, bleed excessively.

Vitamin D. This is the one vitamin that is not essential to take in our food because we can make it ourselves in our blood simply by sunbathing. People with dark skins must expose more of their skin and stay in the sun longer than people with white skins. In food it is found in milk, butter, eggs, and fish liver oil.

It is important for building strong bones and teeth, and for improving resistance to disease. Children living in dark and smoky cities should be given this vitamin in the form of fish liver oil. Others should take plenty of exercise with their skin bared to the sun.

Vitamin E. This is necessary for reproductive fertility. It occurs in green leaves and in whole wheat, and in many other foods. Normally this vitamin occurs in sufficient quantities in the food. If we see that our diet contains the other vitamins, it will certainly contain enough vitamin E as well.

6. Water. Water is far more essential to the body than is solid food. A man can fast for forty or sixty days, but he cannot go without water for more than a day or two. At least four pints of water should be drunk each day, preferably six, apart from that which occurs naturally in foods like fruits and milk. Lack of water interferes with all life chemistry in the body; it gives rise to feelings of weakness or exhaustion. Lack of water may also damage the kidneys and bladder, or cause stones to form in them. Plenty of water to drink is especially important for sick people in whom germs are forming poisons.

The Choice of Food

Eating the right kind of food depends on two things, (*a*) knowing which are the best foods to eat, (*b*) having the means to obtain such food. So we find that where there is either ignorance, laziness or poverty—often they go together—there we find malnutrition, and the ill-health that results from it. But we also find in many cases that even people with money may be malnourished if they are unaware of the importance of the right choice of food. And poor people with knowledge can do a lot with the little they have.

The following are some of the rules that might guide us in choosing our food.

1. *Variety.* When we remember that it is necessary to eat sufficient of each of the different kinds of food, it is clear

that we must eat a wide variety of foods in order to make sure of eating something of each.

Many people are very conservative in their eating habits. They eat the same sort of food day after day, and if somebody suggests a change of diet they say, "I don't care for that kind of food." Ignorant people, children, and very old people are often like this.

2. *Food should be as fresh and as natural as possible.* All food whether from plants or animals, is derived from living things. The closer to that state of life the food is, the better for us it is. Food should therefore as far as possible be eaten soon after it is gathered. Fruits and most green vegetables should be eaten raw. Yellow vegetables may be cooked a short while.

The seed is one of the ways in which nature preserves the life of the plant from one generation to another. Seeds, and all grains, stay alive indefinitely, and therefore we do not need to eat them at once. But when we do eat them we should eat them in their *natural* state, crushed or milled perhaps, but nothing should be taken away, the whole grain should be eaten. Grain food, as mentioned before, should be soaked in water to start the life processes into activity.

Sugar, white flour, and all processed or preserved foods, are not natural. This does not mean that we must not eat them—life would be very boring without them—but it means that we must regard such things, sweets, white bread, cakes, tinned foods, etc., as luxuries for occasional celebrations, rather than as the everyday essentials of life.

3. *The importance of protein.* Protein of good quality only occurs in sufficient quantity in foods that are often expensive. Meat, milk, cheese, eggs, are often beyond the means of poor people.

Those who can afford these things should include them in their daily diet. Poor people can often obtain certain types of meat, scraps, bones, offal, etc., quite cheaply, which are just as nutritious. Skimmed milk is milk from which the fat (cream) has been taken, leaving the protein part; this can often be bought cheaply and contains just as much protein as whole milk. Poor people must also to some extent rely on beans, peas, soya beans and groundnuts to help make up the protein they require.

The Composition of Some Common Foods

1. *Brown flour*, *yellow unrefined maize meal* (*mealie or corn meal*), *millet* (*sorghum*, *guinea corn*, *kaffir corn*). These contain mostly starch, with vitamins B and E, and a little protein.

2. *White wheat flour*, *white rice*, *white stamped corn or maize* (*samp*), *cassava*, *sugar*. These are almost pure carbohydrate with little or no protein and most of them have very few vitamins.

3. *Milk* (*cow*, *goat*, *sheep*, *ass*). This is chiefly of value for its protein content. It also contain sugar and fat which are necessary for infants but not for adults. Milk also contains the valuable mineral, calcium.

Milk is equally nutritious whether it is fresh (sweet) or whether it is thick (sour), or in the form of cheese.

4. *Meats*. These contain mostly protein. If the beast was in good condition before slaughter, meat also contains fat and a little sugar.

5. *Butter*, *lard*, *dripping*, *cooking oil*, *etc*. These are almost pure fats.

6. *Eggs*. Eggs are mostly protein with some fat and many vitamins.

7. *Fruit and Green Vegetables*. These are a valuable source of cellulose, and a rich source of vitamins C and B. They also supply minerals, especially iron. They often contain a little starch and sugar. Plantain and banana contain more starch.

8. *Yellow vegetables*. These are good sources of cellulose and of Vitamin A. They may contain other vitamins too.

Calories. The Calorie is the unit of "energy" in the sense used by the scientists. It is the way food is measured in terms of the "work" that could result in the body eating it. It has no relation to nutritive value in terms of proteins, vitamins, etc. Fat is the most calorie providing of all foods.

Books on hygiene are fond of listing the "calorific values" of foods, but such values are not of much importance to individual persons. Persons in charge of institutions, or others feeding masses of people as cheaply as possible, may need to know the calorie value of food, however. They should consult larger books than this.[1]

Tea and Coffee. These drinks contain a stimulating drug called caffein. It has the effect of making us feel refreshed in body and mind. There is no evidence to suggest that any harm has ever been caused by adult persons taking these substances in normal quantities, though they sometimes cause indigestion.

Alcohol. The taking of alcoholic drinks is quite a different matter. Alcohol at first stimulates the brain, but later poisons it.

The poison has the effect of smothering all the higher and nobler parts of the mind. A man under the influence of alcohol is less of a man and more of an animal or an ill-disciplined child. He lacks a sense of responsibility, he cares not for the feelings of others, and his conscience is blunted. His behaviour degenerates, and crime or sexual immorality may result. A person who has taken alcohol cannot think so clearly, nor can he perform fine or skilled work so accurately.

The body also suffers. The ability to maintain correct temperature is affected so that the body may be chilled, allowing infection to get in. The liver and heart are poisoned, and the length of life is shortened.

Food Sanitation

Germs can be spread from a sick person to a well one on food. This has already been mentioned in Chapter 2, page 58. Here are some more rules about food and kitchen practices to avoid such happenings.

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[1] For example see "Food Composition Tables for International Use", published by the Food and Agricultural Organisation of the United Nations, Rome, Italy, price 3s. 9d.

1. All persons handling other people's food should realize their responsibility. They may have disease germs in their mouth, throat, chest or bowels without knowing it. If these germs get on to another person's food serious illness or death might result.

Therefore, all food-handlers must:

(*a*) Wash their hands after opening their bowels.

(*b*) Not taste other people's food.

(*c*) Not use other people's plates or spoons without washing them.

(*d*) Not cough or spit over the food of others.

2. In case food has already been visited by germs, the germs should be killed by cooking, or their multiplication prevented by keeping the food cool. This particularly applies to milk, custard, cake-cream, meats, stews, soups, etc.

3. Milk should either be drunk really fresh, or freshly boiled. If it is to be thickened it must be properly seeded with milk from a previous good quality thick milk. Only healthy cows should be milked, and only healthy milkers should milk them. And the milking should be done in a clean place free from dirt or dust.

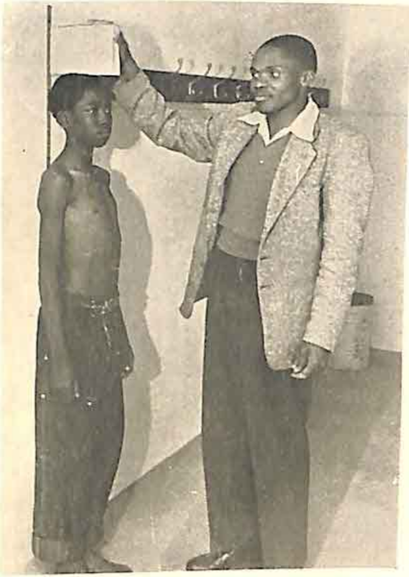
4. Dishes should be washed in very hot soapy water, and rinsed in very hot clean water. There is no need to dry them —a cloth often adds more germs than the water has washed off.

5. Fruit bought in a shop should be washed in cold water before eating, because it may have been sprayed with arsenic or D.D.T. while growing, to kill insects.

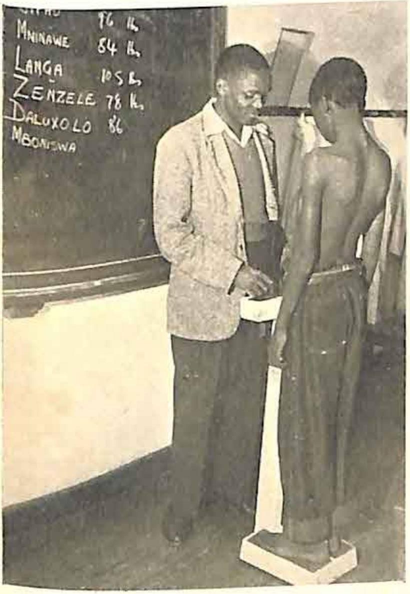
How to Eat

Not only must the foods be chosen wisely, but they should also be eaten wisely. It is not always realized that digestion can be greatly improved if a few rules are followed:

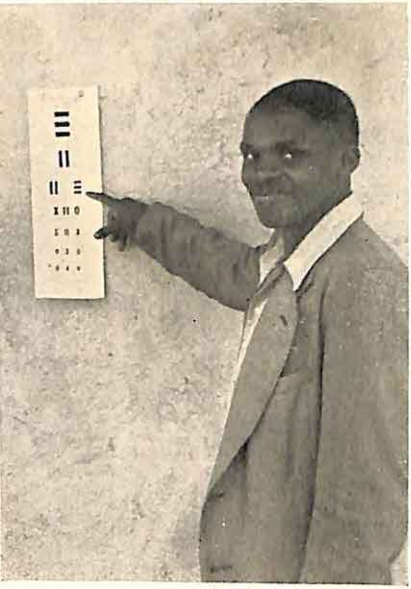
1. Eat slowly. Each mouthful should be chewed slowly and thoroughly without any rush or hurry. The taste of the food should be such that each mouthful can be enjoyed as a



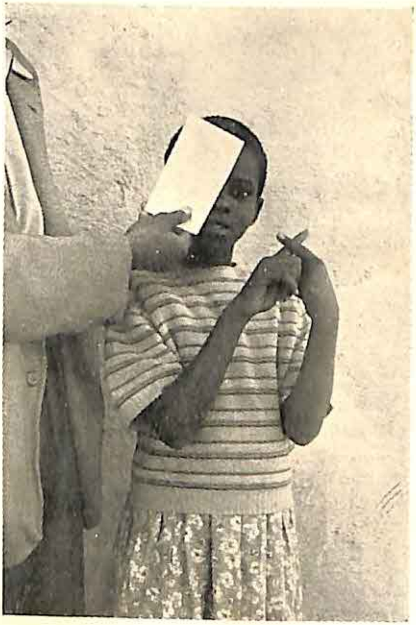
MEASURING HEIGHT



WEIGHING



EYESIGHT TESTING



AN ILLITERATE CHILD HAVING HER EYESIGHT TESTED pleasure to be prolonged. Thirty bites per mouthful is said to be normal—though to have to count them would surely spoil the pleasure. Good teeth are of course essential.

2. Do not drink with the mouth full of food. This habit has the effect of washing down unchewed food, food in a lumpy state, that may damage the lining of the stomach. Drinking is the lazy man's way to avoid chewing.

3. Do not overfill the stomach. It is bad to get up from the table with a sense of fullness. This will certainly result in indigestion eventually.

4. The whole body and mind should be rested and relaxed during a meal. Digestion is interfered with if the person is physically tired, or mentally agitated (by such things as anger or worry).

5. The surroundings should be aesthetically attractive. The table linen, crockery and cutlery should be clean and pleasant. There should be an atmosphere of quiet and contentment. Bad manners or dirty habits have a bad effect on people with any sense of decency.

Care of the Teeth

We are provided with two sets of teeth during a life time. It is as important to care for the first set as the second, because the first ones, the milk-teeth so called, pave the way for the others that are to follow.

Teeth should never be pulled out unless absolutely necessary, whether they are the milk teeth or the permanent teeth. If possible a dentist should attempt to preserve the bad teeth by cleaning out the decay and filling the cavity so formed.

Bad (decayed) teeth cause pain, indigestion and bad-smelling breath, and they can ruin a person's good looks. The germs from bad teeth can get into the blood, lowering the general health.

Causes of tooth decay and rules for preventing it

1. *Heredity.* Some families seem to have worse teeth than others. We cannot do much about this.

2. *General health and nutritional state.* People in poor general health, especially people poorly nourished, often have bad teeth. Vitamin D is especially good to enable children to form good strong teeth. If expectant mothers are well nourished their children are more likely to have good teeth.

3. *The kind of food eaten.* Teeth, like any other part of the body, need to be exercised. They are exercised by chewing hard food like tough meat, toasted mealies, (roasted corn) hard fruits and vegetables like apples or raw carrots. Soft food like porridge and bread, if eaten continually, results in soft teeth.

Sweets, bread, biscuits, and such-like soft foods should not be eaten before bed unless the mouth is washed out afterwards, because these foods get between the teeth and rot there during the night.

It is a good thing to drink water, or rinse the mouth with salt water, after every meal.

4. *Fluorine.* If your drinking water contains a little fluorine—but not too much—the enamel cover of your teeth is likely to be stronger. If necessary the public health authority will add the fluorine to the drinking water.

5. *Cleaning the teeth.* This should be done every night and morning. A soft brush or chewing stick, with toothpaste or salt, should be used. It is also useful to rub the gums with a clean finger, after cleaning the teeth.

6. *Consult your dentist.* As soon as a tooth starts to go bad the bad place should be repaired at once. Since we cannot always see when decay starts, especially if it is between or at the back of our teeth, it is wise to consult a dentist (or dental hygienist) every six months if this is possible.

Care of the Bowels

In order for the bowels to open sufficiently often the following rules should be followed:

1. The food should contain sufficient *roughage*, the cellulose obtainable from fruit, vegetables and the husky

covering of seed grain ground whole—e.g. wholemeal brown bread.

2. The diet should not contain too much carbohydrate as compared with protein.

3. Sufficient *water* should be drunk.

4. The body should be *exercised* daily.

5. The lavatory should be visited *regularly* at the same time each day, e.g. on getting up in the morning.

6. *Laxatives* (medicines to soften the motions) should rarely be taken. They may occasionally be necessary due to upset in diet or habits, or due to infectious disease. Suitable laxatives are fruit salts, Glauber's salts, Epsom salts, cascara and senna. Liquid paraffin (mineral oil) was formerly a popular laxative, but is now known to do harm in some cases.

7. *Purgatives* (medicines to clear out the bowel) should not be used except on medical advice. Castor oil is occasionally used to clear the bowel of dysentery or food poisoning.

Chapter Four

CARE OF VARIOUS PARTS OF THE BODY

The Eye

The eye is the nerve organ by which the brain receives the sensation of sight or vision.

Each eye is a hollow ball, filled with clear watery fluid. The front part, called the *cornea*, is transparent like glass. The cornea sticks out slightly in front of the rest of the eye; this can be seen if you look at the side of the eye of another person.

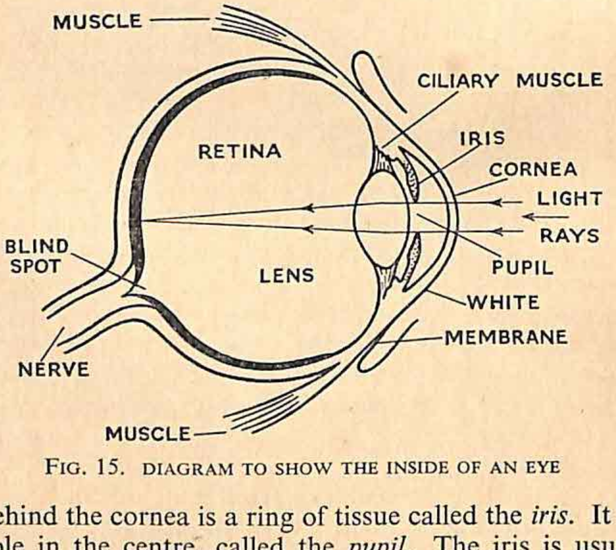


FIG. 15. DIAGRAM TO SHOW THE INSIDE OF AN EYE

Behind the cornea is a ring of tissue called the *iris*. It has a hole in the centre, called the *pupil*. The iris is usually brown in colour so that it will not let the strong light through. In albino people there is not this protection and their eyes are consequently often sore. Some European people have irises of a blue or grey colour. The iris is made of muscle which can move in such a way as to make the hole, the pupil, larger or smaller. In bright light the pupil is very small; in a dark room, or at night the pupil is large. The size of the pupil also varies according to the distance of the object that the eye is looking at. When the object is near the pupil is small; when the object is far the pupil is large.

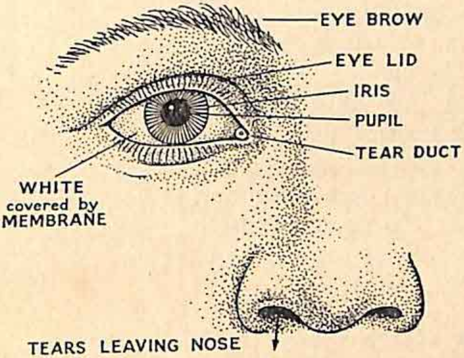


FIG. 16. THE PARTS OF THE EYE

Behind the iris lies the *lens*. This is made of a clear glass-like substance, and has the power of bringing the object to a focus, that is to say making a small picture of the object on its other side. In the same way a magnifying glass will make a small picture of the window. The human lens, however, unlike any man-made lens, has the power of altering its shape to focus near or distant objects. This is done automatically by a ring of muscles round the lens called the *ciliary muscles*.

At the back of the eye the picture of the object is formed upside-down, on a lining of special nerve tissue called the *retina*. The cells of the retina are affected by light, and are connected to a large nerve called the optic nerve which takes the picture to the brain where it is comprehended. At the place where this nerve leaves the eye is a spot which is blind because there are no retina cells there.

The eye is moved by small string-like muscles attached all round it.

The eye-ball itself is white in colour, and is protected from the air by a mucous membrane called the *conjunctiva*. This membrane also lines the eye-lids.

The front of the eye is continually bathed by *tears* from a special gland (lachrymal gland), which washes away dust and germs. These tears run out through a hole at the inner corner leading to the inside of the nose. These tears increase when the eye is excessively irritated by such things as smoke or dust. The emotion of sorrow also causes tears to flow, but the reason for this is not obvious.

The *lids* protect the eye from injury. They blink by automatic reflex action when danger approaches. They also shut to allow the eyes to rest during sleep. The hairs on the lids, called *eyelashes*, also help to keep out dust and insects. The *eyebrows* keep the sweat of the forehead from running into the eyes.

(a) Care of the Eye-Sight. When the eyes cannot see properly it is usually due to the lens being unable to focus the picture on the retina. There are various forms of this.

1. *Short Sight* (myopia) is more often found in children. The child can see only if he holds the book close, and he cannot see the blackboard. He must not be made to strain to see things, otherwise permanent damage may result. Violent exercise may also damage the eyes of children with short sight. The condition can be relieved, but not cured, by suitable glasses.

2. *Long Sight*, where the person cannot see to read, or holds the book away from him, comes on usually in old age.

3. *Eye-Strain* (astigmatism). This is the most common condition. It is due to fatigue or inefficiency of the muscles that work the lens. The person finds it a strain to use his eyes, he gets headaches easily, and his eyes are often sore. Eye-strain is undoubtedly a product of civilization. We

have to use our eyes for fine and complicated work, especially for reading, far more than our forefathers had to.

Rules for avoiding eye-strain

(i) Have frequent examinations of the eyes to test the eyesight. See Chapter 8, page 209.

(ii) If the eyesight is defective a reliable eye-doctor (ophthalmologist) or supplier of glasses (optician) should be consulted.

(iii) Very fine work should not be given to the eyes, especially in the case of children. Very fine sewing or drawing is bad. Books with small print—Bibles and Prayer Books are often offenders—should not be used.

(iv) Use the eyes for fine work only in a good light. Sunlight is not a good light to work in because it is too bright, and it casts hard black shadows. Shaded daylight is best. At night several lights should be used, to increase brightness and avoid shadow. Children should never be made to read, write, or sew at night unless the lighting is very good.

(v) If the eyes are being used for fine work such as sewing or reading, they should be rested every so often, by closing them or by looking at things further away.

(b) Caring for the Health of the Eyes Themselves

1. *Nutrition.* The eyes are one of the first places to suffer when a person is badly nourished. Lack of protein, and lack of vitamins A and B, allow germs to attack the eyes, and inflammation of the eyes results.

2. *Dust, dirt and smoke* are common things that irritate the eyes. Children should not be allowed to rub their eyes, especially with dirty fingers. The lids can be washed with a clean wet cloth. Children should not be allowed to stay in a smoky room, such as a kitchen hut without a chimney.

3. *Germs* are often rubbed into the eyes by dirty hands. Flies also bring germs to the eyes, especially the serious blinding disease called trachoma.

4. *Venereal disease.* Babies can catch venereal diseases from their parents, and these often affect the eyes. The eyes

of *all* new-born babies should at once be gently washed with diluted Dettol to wash away germs which might have come from the mother's private parts. Midwives usually use silver antiseptic, which is even better. In older children clouding of the cornea or iris may be due to syphilis, which will need a lot of treatment if blindness is to be prevented.

5. The *doctor* should be consulted whenever the eyes, or eyelids are red, or swollen, or painful. If the cornea is damaged, especially if there are white spots on it, a doctor must be seen at once, or blindness may result. If the doctor gives drops or ointment for the eyes it must be placed *under* the lids.

6. *Grit or splinters in the eye.* This can sometimes be removed with a corner of a *clean* handkerchief. (Do not touch the corner with your fingers.) If this is not successful, keep the eye closed by means of a bandage until next day, by which time it may work loose by itself. Do not rub the eye. If this is not successful a doctor should be consulted. If the object is on the *cornea* a doctor should be consulted at once if it cannot easily be removed by the handkerchief.

Blindness. It is estimated that there are thirty-three thousand blind persons in South Africa. In some parts of West Africa there is at least one blind person for every hundred normal people.

Most blindness is preventable. The common causes of blindness are:

(i) *Gonorrhoeal* infection at birth.

(ii) Inflammation of the eyes (*conjunctivitis*), especially corneal ulceration, associated with vitamin deficiency.

(iii) Severe *short sight* without glasses.

(iv) *Glaucoma*, increase of pressure in the eyes. (This occurs in old people and the cause is not exactly known.

(v) Congenital *syphilis* of the eyes.

(vi) *Trachoma*, a form of severe conjunctivitis, caused by a germ.

(vii) *Cataract*, dullness of the lens, usually in old people, but sometimes in young. (The cause is not properly known.)

(viii) *Injury* and accident.

(ix) Some types of *alcoholic* drink poison the eyes, causing blindness.

(x) In West Africa much blindness is due to damage to the eyes by filarial worms carried by the simulium fly, a condition known as *onchocerciasis*.

Apart from the terrible tragedy for the blind person, blindness is also a drag on society. Special institutions have to be provided, and pensions paid out. Some blind persons can be trained to do useful work such as basket making, or working at a telephone exchange.

Many books are now available for blind persons, printed in a special raised type of print which is read with the tips of the fingers. This is called the "Braille" method.

The Ear

The ear is the organ by which the brain receives the sensations of sound. The organ of balance is situated in the ear too.

The ear consists of three parts:

1. *The outer ear*. This is the tube running into the head. On the outside there is a trumpet-like fold of skin to collect

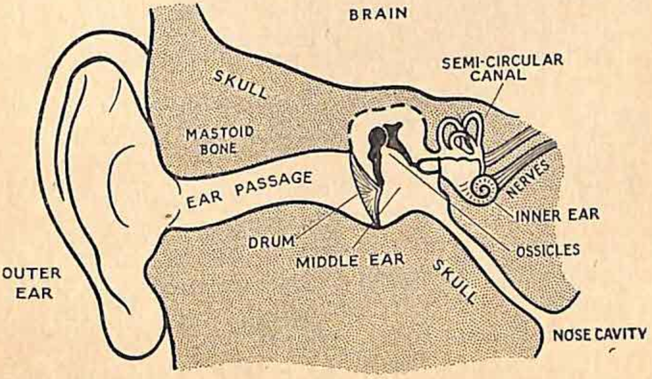


FIG. 17. DIAGRAM TO SHOW THE INSIDE OF AN EAR

the sound and lead it down the tube. At the bottom of the tube is a thin skin called the drum.

2. *The middle ear*. This is a hollow chamber, connected by a passage to the inside of the nose cavity. Thus there is air on both sides of the drum. Across the space of the middle ear are three small bones (ossicles) which carry the vibrations of the drum to the nerves on the other side.

3. *The inner ear*. This contains a collection of nerve cells attached to the nerve which leads to the brain.

In the inner ear is also the organ of balance, sometimes called the "semi-circular canals". This is connected by another nerve to the brain.

Care of the Ears

1. *Cleanliness*. It is not possible to clean the ears in the ordinary way, and it is harmful to try to do so. The lining of the ear tube and the drum especially, are very delicate and easily damaged. If wax collects in the ear it may be softened by a few drops of medicinal liquid paraffin, or by hydrogen peroxide. If this does not remove it a doctor should be consulted.

2. *Foreign objects in the ears*, such as a bead or a mealie grain. If it is near, it may sometimes be shaken out. If this does not work or if the object is deep, a doctor should be consulted. Do not poke things in as this may permanently damage the drum.

3. *Tick in the ear*. Fill the ear with medicinal liquid paraffin, and wait for the tick to come out by itself. Do not pull it out.

4. *Earache*. This is usually due to inflammation of the middle ear, due to infection coming up from the nose. It often follows after a bad cold or a sore throat. Pus forms in the middle ear cavity. If the pain is severe a doctor should be consulted. Hot poultices and hot ear drops may help. This condition can be dangerous to life.

5. *Discharge of pus from the ear*. This often follows from an attack of earache. The pus in the middle ear bursts

through the drum, which is nature's way of cure. But unless the drum can be quickly healed, permanent deafness may result. The person should sleep with the bad ear downwards. By day the pus can be washed out as much as possible and ear drops put in. The doctor, dispenser or chemist will advise on the kind of ear drops. A strong solution of Epsom salts, or Glauber's salts, may be used. A hot poultice may help.

Deafness. Temporary deafness may be due to (*a*) wax in the ear, (*b*) blocked middle ear air passage, usually due to catarrh, (*c*) inflammation of the middle ear.

Permanent deafness may be partial or complete. The commonest cause is (*a*) old middle ear disease which has destroyed the drum; (*b*) continual loud noise damages the inner ear; (*c*) children are sometimes born deaf, the commonest cause being german measles occurring in the mother during pregnancy. Children born deaf, are naturally also dumb unless specially trained; (*d*) some loss of hearing usually comes on with old age.

The Organs of Breathing

(a) Care of the Respiratory Passage

1. As far as possible air already breathed by other people should not be used again, as it may contain germs from their respiratory tract. This can be to some extent avoided by seeing that fresh air from outside is blowing through the room.

2. As far as possible dusty air should be avoided.

3. We should always try to breathe through the nose only, not through the mouth. The nose is equipped with special tissues which make the air warm and moist, and extract much of the dust and germs. (An athlete may breathe through his mouth when exhausted by severe exercise. This is permissible.)

4. The mucous membranes of the respiratory tract seem to become delicate if the body becomes chilled or cold. We say we have caught a cold in the nose, or a chill on the chest.

The way to avoid this is not to wrap the body up all the time—that merely makes the body more and more delicate—but to get the body used to sudden lowering of the temperature. Some of the best ways to do this are (i) by taking a cold bath or shower every morning, (ii) by taking exercise in the cold weather wearing few clothes (e.g. as in football).

The ways in which bodies are often seriously chilled are (i) wearing wet clothes, e.g. after having been caught in the rain, (ii) sitting in the cold, scantily clad, after violent exercise (e.g. after football or athletics). Players should always put on a warm "sweater" if the wind is cold, (iii) coming from a hot room at night (e.g. a dance hall or cinema) and standing about in a cold wind.

People from the tropical lowlands are especially liable to catch pneumonia in the cold night air of the high veld or inland plateau.

(b) Care of the Nose

1. Nothing should be put into the nose which might damage the mucous membrane. Children are especially fond of putting things up the nose, or of "picking" the nose with the finger. Either of these habits may lead to diseases of the nose or sinuses.

2. Mucus should be blown out of the nose gently. Many people make the mistake of tightly blocking the nose with the handkerchief before blowing. This may have the effect of blowing the mucus sideways into the sinuses or into the middle ear, causing inflammation of those parts. The handkerchief must be held *loosely* over the nose. Sniffing the mucus backwards may also be harmful, as some of it may go down the wind pipe.

3. There is no really effective treatment for a *cold* in the nose. It should be treated on general lines by rest in bed, hot drinks, aspirin and vitamins.

4. *Hay fever*, a running nose due to irritation or allergy, may be treated by inhalation of certain vapours.

5. *Nose bleeding*. The blood vessels in the front of the nose are easily damaged, and nose bleeding is a fairly common complaint. The sufferer should sit upright near a window and quietly breathe cold air. A cloth, wet with cold water, may be placed on the nose and the back of the neck. The nostril on the offending side can be pressed closed against the central bone. If this does not stop the bleeding, small plugs of cotton wool may be packed into the nose. If this does not suffice, medical help should be called.

(c) **Care of the Lungs.** Apart from seeing to the purity of the air we breathe, the important thing is to keep the lungs well exercised, and the chest developed. If sufficient physical exercise is taken, there is no need for special breathing exercises.

The Skin, Hair and Nails

Functions of the skin:

1. The skin is a *protective covering*, within which all the chemical processes, which are necessary for life, can carry on. It cannot be penetrated from the outside by air, water, dirt or germs, unless it is injured. It produces a greasy substance which has some power of killing germs. Sunlight can penetrate the skin a short way.
2. The skin is a *heat regulating* organ of the body (see Chapter 1, page 43).
3. The skin is a *sense organ*, containing especially the nerves of touch and pain.
4. The skin is sometimes said to be an *excretory* organ because it sweats. (This is not strictly accurate and is misleading.)

The appearance of the skin

The skin is that part of the body that is seen most often, and it is consequently the part which most often shows whether the body is healthy or not.

A healthy person is said to have a good "complexion".

The skin looks warm and shiny. It feels soft and smooth, and when pinched gently it feels thick and strong.

Malnourishment often shows in the skin (see Chapter 8, page 201).

Anaemia often shows in the skin. The skin looks pale, grey or earthy. The same is seen in the condition known as "shock".

In persons with fever the skin may be hot and dry or cold and wet.

Spots and rashes on the skin are of many different kinds:

1. Local infections, such as septic sores or impetigo, ringworm.
2. General infections, such as smallpox, chickenpox, measles, syphilis, leprosy.
3. Allergic disease, heat-spots, infantile "rough skin", nettle-rash (urticaria), eczema.
4. Degenerative diseases, ulcers.
5. Developmental diseases, such as acne, the rash of adolescent youths.
6. Warts, small non-dangerous growths.
7. Birth marks, harmless discolourations.

(a) Care of the Skin. A healthy skin, as already noted, occurs in healthy bodies. Especially is exercise and nutrition important.

Cleanliness is also obviously important. A daily bath should be the rule if possible. The rubbing with a rough towel afterwards benefits the skin too. The skin is also stimulated by a cold shower, especially if following a hot bath. This exercises the blood vessels of the skin.

Sunbathing is of great value to the skin and to the whole body, as it causes vitamin D to form. Persons with dark skins need to expose more skin, and for longer time, than light-skinned people, as the pigment holds back the sun's rays.

(b) Care of the Hair. Hair should be brushed or combed daily. Persons with short hair should massage it with the fingers or rub it with a rough towel. This will encourage the production of the natural oils of the scalp, giving the hair a lustrous appearance and preventing baldness.

Hair should be washed once a week, though if the hair is very dry once a month may suffice.

(c) Care of the Nails. The nails should be kept cut short, and should be scrubbed clean daily.

The corners of the big toenails should be allowed to grow out. If this is not done the shoe may press the flesh over the corner of the nail, giving rise to the painful condition known as "ingrowing toenail".

Clothing

Functions of clothing:

1. Protection from the cold.
2. Protection from the sun in light-skinned people.
3. To cover nakedness.
4. To decorate the body.

Of these, only the first one concerns us.

For protection against *cold*, clothing should have the following qualities:

1. It should be loosely woven so that it contains air spaces between the mesh.
2. It should be impervious to wind.
3. It should absorb sweat without becoming wet.

Wool and some of the modern kinds of nylon fulfil these conditions. If cotton is used it must be covered with a windproof garment. Cotton-wool, quilted in windproof material is excellent as an outer garment.

Persons doing hard manual work in cold weather should wear woollen undergarments. Others usually wear cotton.

Babies should be wrapped in woollen garments, especially at night or in cold weather.

Many blankets sold as wool are in fact mixtures of wool and cotton. Flannel is pure wool, flannelette contains mostly cotton. To test whether material is made of wool or cotton, set a match to a small piece of it: cotton burns at once, wool does not burn, but melts away liked singed hair. Mixtures of wool and cotton burn in ways between these two methods.

Cotton garments are highly inflammable. Children wearing them sometimes set themselves on fire accidentally.

Persons doing exercise, such as football or athletics, should wear a minimum of clothing, and change into dry warm clothes afterwards. Children should not sit about in sweaty clothes in cold weather.

White clothing is cooler than black.

In hot weather clothing should allow the free passage of air over the skin. Silk is the coolest material, with cotton next. Art silk and closely woven nylon are hot. Tight clothing should be avoided. Plastic or rubber mackintoshes worn in hot weather may cause excessive sweating, and even heat-stroke.

Underclothes should always be worn. These protect the outer garments from sweat. They can be frequently washed, changed and kept wholesome and free from dirt or germs. The open-wove, mesh or net type are best.

The Kidneys and Excretion

The kidneys are very important organs. Without their actions the body would soon be full of poisonous waste matter.

The kidneys should have plenty of water with which to work. This means that we must always drink plenty of water, especially in hot weather, sufficient to cause at least three pints of urine a day.

Kidneys are sometimes damaged by such diseases as tonsillitis, typhoid fever and malaria. They are also sometimes damaged during pregnancy. Persons suffering from infectious fevers, and pregnant women, must drink more water than usual.

The signs of kidney diseases are not always apparent to the patient. Only a doctor can tell, by examining the urine chemically. Backache is not usually due to kidney disease;

more often it is due to bone or joint strain, or, in women, disorders of the reproductive organs. Kidney pain usually comes round to the front. If the bladder or urethra are diseased, there is an increased desire to pass water, and the water may feel "hot" or painful.

The so-called "kidney pills" should not be taken except on doctors' orders.

Chapter Five

ACTIVITY AND REST

Exercise

The Need for Exercise

In order to keep healthy, our bodies and minds must be *used.* Life itself is something moving, something dynamic. If we allow our bodies or minds to be inactive, we are acting contrary to the forces of life.

Supposing you broke your leg and had to keep it in a splint for a few months to allow the bone to mend. You would find when the splint was taken off that the leg was thin and weak and useless. The muscles would have become soft and flabby and the joints loose and shaky. This shows that our muscles and joints can only keep in good working condition by daily use. The same applies to our lungs, heart, brain, eyes, teeth, etc. They all need to be used in order to keep well and strong.

In the old days, before the dawn of civilization, men depended entirely, just as wild animals do to-day, on their physical fitness, on the strength and efficiency of their musculo-skeletal system, in order to survive at all. The only food was that caught by hunting, and there was continually the necessity to fight, or flee from, one's enemies. For untold thousands of years the men who survived to rear families were those whose bodies were continually kept at this pitch of efficiency. And we are the descendants of those men, and the inheritors of those bodies.

Our ancestors did not need to "take exercise" deliberately. Their daily occupations gave them enough. Since those days the amount of hard physical labour necessary for life has been steadily decreasing. The plough has replaced the hoe. Improved forms of transport, and labour-saving machines, are doing away with much physical effort on the part of the worker. There are, of course, still many people who perform hard physical work daily, agricultural workers, miners, and such-like persons. But for many of us there is the need for deliberately taking exercise in addition to our work. We have, in fact, to devote some of our free time to caring for our bodies in this way. Just as we give some of our free time to washing ourselves or feeding ourselves, so we must similarly devote some time to exercising ourselves.

Though physical exercise is important, however, muscular strength and efficiency is not its only object. Strength alone is not health. Many young men mistakenly imagine that by building up their muscles they are therefore making themselves "fit", and by "fit" they mean healthy. But physical fitness is but a part of the total health of the body. Cleanliness, nutrition, personality, are all-important too.

And we must not forget the necessity for *skill*. Mere strength will not enable the hunter to catch his quarry, nor it will enable a boxer to win a fight. There is nothing more pathetic than the man who is "all brawn and no brain".

On a national scale the worship of physical strength, to the exclusion of all else has resulted in tyrannies and dictatorships, because mental "strength" came to be worshipped in the same way. Ruthlessness, intolerance, hard-heartedness, came to be thought desirable. Such people forget that in human relationships, softness is also necessary; gentleness, generosity, love, kindliness, sportsmanship must have their place.

The Physiological Effects of Exercise

Some of the ways in which exercise affects the body are as follows:

1. The heart-rate is increased.
2. The lungs breathe faster.
3. More blood is in circulation. The spleen and liver

contract to squeeze out their reserve blood. This sometimes causes a painful "stitch".

4. Glucose, obtained by the digestion of carbohydrates in the gut and stored in the liver, is used up rapidly as a fuel.

5. If there is not enough glucose available, some of the fat from the stores in the body may be used as fuel. Thus the body may lose weight.

6. Heat is produced in excess due to the increased chemical changes going on. So the body has to sweat more to keep itself cool. This is why exercise makes one thirsty.

7. Salt is lost in the sweat, and extra is needed in the food of those taking exercise (but most people take more than they normally need).

The Benefits of Exercise

1. The increased use of muscles makes them stronger, so that they perform more work with less effort.

2. Joints and bones become stronger and more easily movable.

3. During exercise the blood has to circulate more quickly (in order to get rid of carbon dioxide and waste products). This means that the heart has to pump more quickly, and this strengthens the muscles of the heart (provided the heart is young and healthy enough to benefit this way).

4. The increased circulation of blood round the body benefits *all* the tissues and organs. Chemical changes are speeded up, and waste matter removed more readily. The brain, liver, kidneys, glands, etc., all benefit.

5. Persons taking exercise *feel* healthier. Exercise gives a feeling of wellbeing, a feeling of energy, enjoyment and zest for life.

6. The body as a whole becomes stronger and more efficient. In the Army, recruits who had never done more than sit on an office stool before, were turned by means of exercise into skilled fighting men in a few months.

7. Exercise soothes the troubled mind, takes away worry, and eases tension. The brain becomes clearer and mental work easier.

Bad Effects of Lack of Exercise

1. The body is not kept in a state of training, and any sudden use of it, as for example running for a bus, may seriously damage it.

2. In the unexercised body much of the lungs remain unused, and it is in these parts that disease germs like to settle.

3. Weakness of the muscles results in poor posture, which has other bad effects (see later, page 122).

Bad Effects of Over-exercise

It is possible to over-strain the body, especially the heart, if too much violent exercise is done, particularly by an untrained person. This is especially the case in children, and in persons over forty years of age.

Over-exercise is called *exhaustion* or *acute fatigue*. If the rapid heart beat and the panting breathing continue for more than a quarter of an hour after rest, it is probable that the exercise has been overdone, and has caused more harm than good.

Fitness for Exercise

In a properly organized school or college, all pupils and students should be examined by the medical officer before being allowed to undertake violent exercise like athletics or boxing. The doctor will issue a certificate of fitness in each case. These certificates are held by the Physical Education teacher who is responsible for seeing that only those with certificates take part in these exercises.

Where there is no doctor available, the Physical Education teacher should exclude all those who have previously suffered from rheumatic fever or tuberculosis. He should watch out for pupils who appear weaker than normal, who cannot do the same gymnastics as their fellows, who always lag long behind in the races. Such pupils should be sent to a doctor for an opinion.

The Amount of Exercise

The question is, how much exercise should we have in order to keep fit, yet without doing so much that we overstrain ourselves?

1. *Children* are continually active, and older people marvel at their energy. Children need all this exercise in order to grow strongly. Children are not likely to overstrain themselves if not driven on unnaturally, as may sometimes occur, for example in competitive school sports. When children were made to *work* in the old days, in mines and in factories, overstrain undoubtedly occurred. Children should always be given plenty of rest and sleep, and in these circumstances they have very good powers of recovery, so that overstrain is very rare.

2. *Young adults*, if they are healthy and well nourished, can undertake any form of exercise that attracts them. Over-fatigue is rare at this age, provided that the person is in good training.

3. *Older persons*. After the age of about forty (depending on the previous activity of the person), strenuous exercise should be gradually given up. Exhaustion over this age can do serious permanent damage to the heart.

But even the oldest persons should never give up all forms of activity. They should try to "keep going" for as long as they can, doing all the exercise that is possible without feeling strain or exhaustion. Persons who have led an active life, and then "retire" suddenly, changing their way of life entirely, often do not live long.

4. *Girls and Women*. It used to be thought that girls and women should not indulge in the kind of sports and exercises that men go in for.

More recently it was realized that exercise is just as necessary to make women healthy as it is for men. But this does not mean that women should try to take the same amount of exercise that men do. Women obviously cannot be as strong as men; they cannot run so fast or jump so high.

Girls have an additional reason for wishing to make their bodies and hearts fit and strong. Most of them will eventually become mothers. Childbearing is a great physical strain, which may seriously damage those who are not in a state of fitness.

It is sometimes asked whether girls should give up exercise during menstruation. This is not usually necessary at all. Indeed, exercise at such times may be beneficial, especially to those who have discomforts and pains.

Women expecting babies should not take violent exercise, or any exercise involving running and jumping, owing to the danger of miscarriage. They should, however, keep fit by walking, gardening and light work.

Types of Exercise

1. *Organized games*. These are such things as football, tennis or cricket.

As forms of exercise they are very valuable because the bodily movements are natural and so develop not only muscular strength, but *skill*, particularly in co-ordination of hand and eye.

Another great advantage of this form of exercise is that it develops character. The player is a member of a team, and learns to co-operate with others and to obey a captain. Above all he learns the meaning of "sportsmanship"; to be able to try to win yet to accept defeat, to obey the rules and accept the ruling of the referee, to give his opponent the benefit of any doubt, to understand that any form of cheating spoils the whole purpose of sport, that games are played not for the glory of winning but for the sake of "playing the game".

A big disadvantage of team games is that only a small proportion of the school plays. The rest watch. Organized games should preferably be of a type that the whole school can join in at once.

Another disadvantage of most organized games is that large flat grounds are needed, as well as expensive equipment.

2. *Athletic sports*. This form of activity is popular because it allows individuals to demonstrate their abilities. Only a

small proportion of the participants can, however, get this sort of satisfaction.

Athletic sports are usually only indulged in for a few strenuous weeks of the year. All those taking part should be made to undergo gradual training. Among young school children serious over-exhaustion can occasionally occur if the Physical Education teacher is not watchful.

3. *Physical training, drill or callisthenics.* These are various exercises designed to benefit the various limbs or parts of the body, to strengthen a particular set of muscles or ligaments, to make joints more supple.

An advantage of drill is that it needs no equipment, and very little skill on the part of the teacher, provided he knows the basic essentials. The whole school can take part at one time, with only one teacher to supervise it.

In group drill of this sort, the child learns self discipline and learns to obey orders. Children often enjoy the sense of rhythm that comes from taking part in movements done by a mass of others, all in time together. In the army this kind of drill rapidly produces physical fitness and encourages discipline. It is popular in militaristic countries like Germany and Russia.

A disadvantage is that it does not encourage individual talent or initiative. It leaves no sense of achievement, and is therefore not mentally stimulating. It does not develop skills. Many children find it boring, unless the teacher can make some sort of game of it.

Unless it is properly conducted, the body may be developed unevenly, some parts exercised and other parts neglected. The exercises are often unnatural, and may merely increase muscular strength without imparting grace or skill.

Exercises of this sort may be usefully performed by older persons by themselves when there is no other form of exercise available. Many people perform them on getting out of bed in the morning. They should be done in the open air or in front of an open window. They loosen up the limbs, tone up the heart, and generally make the person feel fresher. They are sometimes called "setting-up" exercises.

4. *Gymnastics*. This form of exercise usually requires expensive apparatus. It is popular in the cities of colder climates, and is usually performed in special halls, gymnasiums, which can be used at night in any weather. Almost every Y.M.C.A. has its gymnasium, for example.

The exercises include such things as horse vaulting, rope climbing, horizontal bar and parallel bar work, etc. Individual skill is encouraged, and a great degree of muscular strength is obtainable.

5. *Hiking*. This is a form of natural outdoor exercise which is popular with boys. It consists of long cross-country walks, sometimes involving an overnight stay. It can include mountain climbing, camping, scouting, geography and nature study. It benefits not only the body, but also the character.

6. *Useful pursuits*. As long as there are such things to be done as gardens to be dug, roads to be made, fields to be contoured, gullies (*dongas*) to be filled, or trees to be planted, it would seem a useless waste of time and energy to indulge in formal exercise, especially drill. The activities mentioned here would benefit the body equally well, and at the same time provide some concrete achievements.

These activities may, however, be boring unless proper motivation is first provided. They do not exclude the necessity for games, as they cannot develop skills and sportsmanship.

7. *Dancing*. This is an enjoyable form of exercise, especially the traditional folk dances, performed in the open air. The modern "ballroom" dances, often held in crowded, badly ventilated rooms, and continuing late into the night are, however, of little value, and may do actual harm; respiratory infections may occur, and the lack of sleep may lower the general health.

There is much argument with regard to the sexual aspect of dancing, and some religious denominations condemn it for this reason. But it must be admitted that young adults feel the need of some sort of communal activities in which both sexes can share, and this is not usually possible in other forms of exercise, with the exception perhaps of hiking and tennis. Dancing may therefore serve a useful, harmless and socially acceptable, outlet for the bringing together of the two sexes. But it must also be admitted that dancing probably stimulates interest in sexual matters, and may lead to the temptation to go farther than is desirable. For this reason, dances for young people should always be held under the supervision of older persons in authority.

Posture

Posture is the position or shape the body takes up, the way the body holds itself, the grace (or lack of it) with which the body moves, the impression of poise or balance (or the opposite) that the body gives. Posture is particularly important when we are either sitting, standing or walking. Since we are doing one of these three things more than anything else during the day, the importance of a good posture can be seen. We should therefore know something about posture.

Posture is a form of exercise. It is the steady pull of the muscles that hold us in position, that prevent us from merely being a shapeless heap on the floor. Especially the muscles of the legs, buttocks, and spine are concerned with posture. Posture may be described as "passive" exercise, exercise without movement.

Good Posture is that which:

1. Holds the body in the position which allows the best working of all organs.
2. Holds the body in such a position that the muscles of posture are not overstrained or fatigued, but on the contrary, are developed and strengthened.
3. Gives the body the appearance of poise and balance. Women are more graceful and men more "manly" when they have good posture.
4. Gives a more mature, self-confident and attractive personality.

Signs of good posture

1. The spine is straight except for its natural curves.
2. The head is well balanced so that the eyes look straight ahead.
3. The shoulders do not slouch forward, nor do the shoulder blades stick out.
4. The abdomen does not bulge, and the chest expands well.
5. The feet and legs appear light and springy.

(Posture in children is considered in Chapter 8, page 201.)

Effects of good posture

These are similar to the effects of exercise.

1. The lungs and circulatory system work better when there is good posture.
2. The body is less easily tired.
3. Work is less tiring and more efficient when performed with good posture, e.g. carpentry or sewing, or attending at class.
4. The mind is clearer, concentration is easier.
5. The physiological state is improved. Miserable and depressed people have a poor posture. We tell such people to "pull themselves together"; not to let themselves "go to pieces", by which we show that we realize that good posture and mental health go together.
6. Good posture gives a good impression on others. If two people with equal merit were applying for a job, the one with the better posture would probably get the job.

Care of the Feet

The feet are the most used, and often misused, parts of the body. Strong healthy feet can save the body from much of the feelings of tiredness, backache, even headaches.

The feet are made of many small bones arranged like the stones in a stone arch. The bones are joined together by ligaments and small muscles. In healthy feet these ligaments are strong and elastic, the joints between the bones move freely, and the whole effect is like a spring which gives with each step yet supports the body.

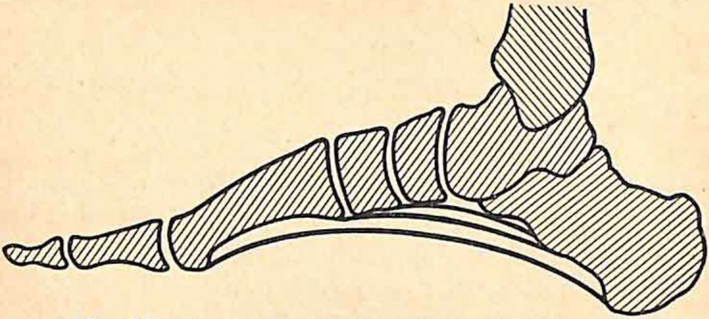


FIG. 18. BONES OF THE FOOT SHOWING THE ARCH AND SUPPORTING TENDONS

In weak feet the ligaments are slack and do not support the bones. The arches collapse, and there is no springiness as the foot touches the ground. Such feet are said to be *flat*. Extra strain is thrown on the leg muscles, and the circulation of blood in the legs is hindered.

The *cause* of weak feet is nearly always the wearing during childhood and adolescence of shoes that are too small. These shoes prevent the development of strength in the ligaments.

Shoes that are too small may also cause (1) deformity of the toes, (2) the inflammation of the big toenail (3) corns and bunions. High-heeled shoes, as worn by many girls and women, are also bad for the feet. They cause corns and bunions on the toes and strain the back.

The best *exercise* for strengthening the feet is to walk barefooted, especially over stony ground. The centre of the arch of the foot is tender and we do not like stones to press there. Hence on rough ground we are continually trying to keep the arch up, thereby strengthening the feet. Many Africans still walk barefooted, especially in childhood, and from this point of view, it is a very good habit.

When walking with or without shoes, the toes should point straight ahead; the heel touches the ground first, then the weight is transferred to the toes. People with weak feet tend to point their toes outwards so that the inner side of the foot moves forward with each step.

If it is necessary to *stand* in one place for a long time, for example, policemen and factory workers, the blood tends to collect in the feet. The feet become swollen, and may ache. Eventually varicose veins may appear in the legs. People who have to stand about a lot should remember to exercise the feet from time to time. Exercises such as "gripping the floor with the toes", standing on the toes, turning the feet from side to side, all help to keep the blood flowing and to relieve the tiredness of those who have to stand for long.

Fatigue

Fatigue is the name we give to a general feeling of tiredness. A certain amount of fatigue is natural at the end of a hard day's work, and is quite harmless as long as it is relieved by rest and relaxation.

Some unfortunate people get fatigued at their work, then add to it by a tiring journey to a home where they spend the rest of their spare time in housework or dancing or quarrelling, or some other fatiguing occupation. Then they go to bed late and get up in a hurry. Such people are liable to be chronically fatigued.

Fatigue is made worse by mental overstrain, particularly by bad temper, envy, worry, hatred, etc.

Work in noisy surroundings, doing monotonous work for long stretches, and the presence of unfriendly workmates, all increase fatigue. Wise employers will give their workers cheerful surroundings, frequent rest periods, incentives to promotion and extra pay, and, in some factories, music, because these things lessen fatigue.

Bad Effects of Fatigue

Fatigue lowers the general health, and particularly lowers the resistance to infectious disease. Such diseases, liable to be caught by chronically fatigued persons, are the common cold, sore throat, influenza, boils, and tuberculosis.

Fatigued persons are more likely to injure themselves and others in accidents. They make dangerous drivers and careless unproductive workers.

Fatigued persons are more likely to suffer from degenerative diseases such as gastric ulcer.

Fatigued persons are not so likely to be in a good state of mental health. They make poor companions and discontented workers.

The relief of fatigue. The best thing to relieve the body of fatigue is *rest* or *relaxation.* There should be plenty of sleep, free from the cares of the day. A change of work and a change of surroundings is often as good as a rest.

Drugs, such as tea, coffee, alcohol and benzedrine, have the effect of making the person *feel* no longer fatigued, but they do not counteract the evil results of fatigue, and should not be resorted to regularly.

Tension, Relaxation and Sleep

Tension is a state of the body which produces effects similar to fatigue. The person is always "keyed up", as though expecting an emergency any minute. It is found in persons lacking in mental security, shy persons, persons lacking in self-confidence; people who are over-conscientious about their work, always striving for perfection, always afraid of failure; and in neurotic persons, particularly those suffering from chronic anxiety.

In the state of tension every muscle is held tight, the heart beats faster than necessary, digestion is interfered with. Such persons do not give a favourable impression to others, and are difficult to work with.

Long-continued tension may also result in gastric or duodenal ulcers, heart disease, high blood-pressure and other conditions. It may shorten life.

Relaxation is the opposite of tension. Every muscle is at rest; all organs are functioning smoothly, and the mind is harmoniously contented.

A few minutes' complete relaxation every day are beneficial to the health of hard-working persons. The best time is after the mid-day meal.

Relaxation of the mind is obtained by turning the attention to something enjoyable, such as light reading or other entertainment—something where mental concentration is not required.

Teachers find that best results are obtained when teaching difficult subjects, if such subjects are alternated with enjoyable periods. Physical exercise for children should contain plenty of stops for rest.

Sleep. Sleep is essential for health. Persons unable to get sufficient sleep, due to pain or worry, or because they spend the time doing other things, eventually suffer in health.

During sleep the cells of the body are rested, refreshed, fed and repaired. The mind is similarly restored and clarified. The body and mind function more efficiently after sleep. School children need plenty of sleep at night if they are to concentrate on their lessons. Lack of sufficient sleep is a common cause of backwardness.

The inability to sleep, *insomnia* as it is called, is often due to mental overactivity. The brain is set for rapid work and cannot slow down. Some causes of this are: excessive concentration just before bed, excessive excitement just before bed, pre-occupation with worries or problems of the day. Worrying about insomnia may itself make the insomnia worse.

Lack of exercise, lack of fresh air in the bedroom, overeating, and other over-indulgences, may also cause insomnia.

Sleep requirements

The following are desirable quantities of sleep:

Babies should sleep almost continuously except for feeds.

Children up to the age of 3 years: 12 hours' sleep by night, one or two hours by day.

Children between 3 and 10 years: 12 hours' sleep by night, one hour sleep or rest each afternoon if possible.

Children over 10: gradually decreasing amounts of sleep from 12 hours to 8 hours per night at about 17 years.

Adults: 7 or 8 hours, depending on the strain of the day's work.

Chapter Six

HUMAN REPRODUCTION

The Biology of Sex

One of the characteristics of all forms of life is the capacity to reproduce. Unless a particular species of plant or animal can reproduce its kind then that species must inevitably vanish off the earth—as many species have already done. In as far as human beings are a part of Nature, then reproduction is as important for us as for any other forms of life.

Among all higher forms of life reproduction is achieved in the following way. The individuals of the species are usually either male or female. (Ants and other insects have some sexless individuals in addition. Worms are both male and female in one.) The females produce special female sex cells, which we call *eggs* (ova), and the males produce special male cells which we call *sperms*. The egg cells and the sperm cells are each incomplete cells, they contain half of what a normal cell contains. It is then necessary for an egg cell and a sperm cell to come together and join, each contributing its half, so that a new complete cell is formed. Out of this new complete cell a new life forms. When this happens we say that the egg cell has been fertilized, or that conception has taken place.

In this way, by taking a contribution from *two* people to make a new life, Nature makes it possible for improvement to take place. Every new individual "inherits" something of the mother's side and something of the father's side.

In all forms of life we see this double contribution to the new life. All young things have a mother and a father. This is true of many plants, as well as of animals.

Sex Attraction

In the lower forms of life reproduction happens automatically, but in animals, particularly in birds and mammals, nature has to provide some way in which the males and females can be brought together to contribute their sex cells to make new offspring. This is called *sexual attraction*, and the mental process which goes with it we call the *reproductive instinct*.

It is obviously desirable that the sex cells should come from males and females who are themselves young, healthy and strong so that (*a*) the offspring can inherit that health, and so that (*b*) the parents are strong enough to feed and protect the young.

Among birds, sexual attraction is achieved by having feathers of beautiful colours to attract the mate. Among baboons the private parts are similarly coloured at mating time. But among most animals sexual attraction consists of interest in an individual of the opposite sex who appears to be obviously young, healthy and strong, the desirable qualities of parenthood. In human language we say that a woman is beautiful, or "attractive", if she has these characteristics—our instinct would say that such a woman would make a suitable mate. So we see that health and beauty go together. The same thing applies to men. Among humans, however, there are other considerations, which will be discussed later.

The Physiology of Reproduction

We call the egg cells and the sperm cells *gametes*. Gametes are formed in the body in special sex glands called *gonads*.

In the *mother* the female gametes, the egg cells, are formed in gonads called *ovaries*. These lie in the bottom of the abdomen, one on each side of the womb. The egg cell is very small, much smaller than a pin's head. It has no shell, yolk or white like a bird's egg.

From each ovary a small *tube* leads to the sides of the womb (*uterus*), and the egg cell falls into one or other of these. The womb lies in the centre of the bottom of the

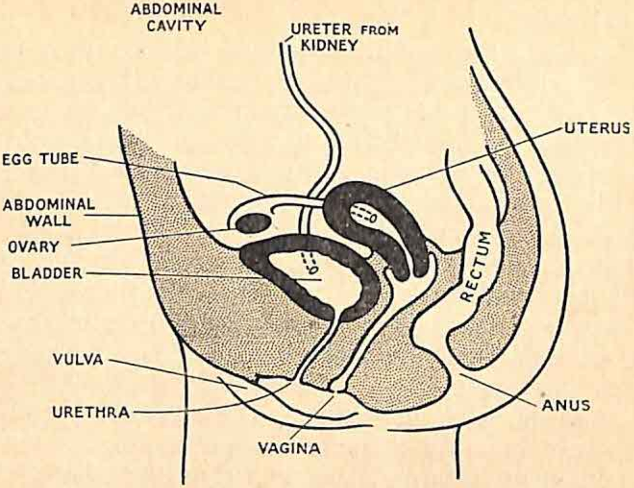


FIG. 19. SIDE VIEW OF THE FEMALE SEXUAL ORGANS

abdomen; it is about the size and shape of a pear, the narrow end downwards. The mouth of the womb is at the narrow end, and opens into the sexual passage which leads to the outside, called the *vagina*.

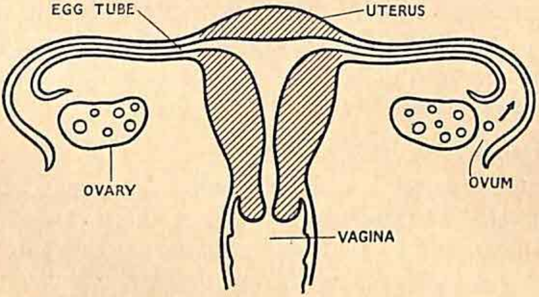


FIG. 20. FRONT VIEW OF THE INTERNAL FEMALE SEXUAL ORGANS

It is in the vagina that the male sex cells, the sperms, are deposited by the father during *sexual intercourse*. (Biologically this process is sometimes called coitus, copulation, or mating.)

The ovaries produce one, sometimes two female sex cells (called eggs, ova, or female gametes) each month, during the time of life that a woman can become a mother. At the same time that the egg is formed each month, the womb prepares itself for the possibility that it may have to nourish a new life. The lining of the womb becomes thick and soft and full of blood vessels. If no new life is to be formed, this lining and its blood is cast out of the womb. Thus, every month the process takes place that we call *menstruation*. If, on the other hand, a baby has been started, there is no menstruation, because the lining of the womb is needed.

The father's male sex cells (called male gametes, sperms, spermatozoa, semen or seed) are produced in gonads called the *testes*. These lie outside the body as a cooler temperature is required by them. A tube leads up from each testis to the base of the bladder, and thence into the *urethra* which leads to the outside in the male sex organ, the *penis*.

During sexual intercourse the penis becomes stiffer so that it can be placed inside the mother's vagina. The *emission* of semen takes place there. The spermatozoa are very, very small, and are produced in large numbers. Each

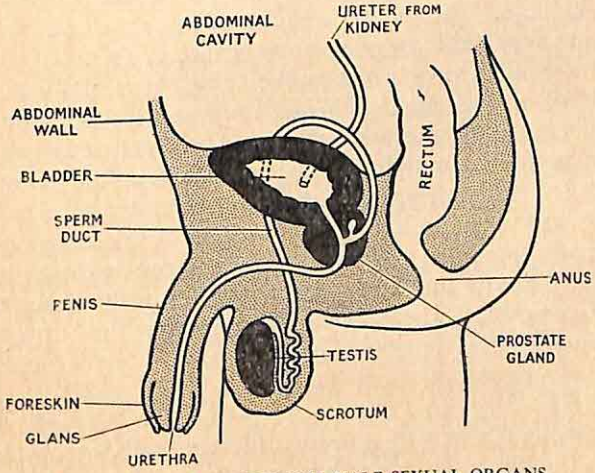


FIG. 21. SIDE VIEW OF THE MALE SEXUAL ORGANS

one is equipped with a moving tail and so is free to move by its own power. They enter the mouth of the womb, and swim through it on into the egg tubes. Only one of the sperms needs to join with the ovum for *fertilization* (conception) to occur.

The act of sexual intercourse, which is such an important matter for the continuance of the human race, is a source of deep emotional satisfaction when it takes place between life partners genuinely in love.

Pregnancy and Birth

The fertilized ovum (*foetus*) descends into the womb (*uterus*) and gradually grows inside it, connected to the wall of the womb by blood vessels running out from its *navel* (*umbilicus*). These blood vessels, which together are called the umbilical *cord*, are attached to the wall of the womb by a large fleshy mass called the *placenta*.

The new baby's blood system is quite separate from that of the mother, but the chemicals, such as oxygen and food, pass from the mother's blood to the baby's blood, and the carbon dioxide and waste chemicals in the baby's blood pass into the mother's blood to be passed out in her lungs and kidneys. The mother's kidneys thus do double work, and are very liable to go wrong because of this.

The womb grows in size as the baby grows. Its walls are made of strong muscle. When the baby is large enough, usually after the mother has missed ten menstrual periods (280 days), the muscles of the womb force the baby out head-first through the vagina into the outer world. The pelvis and vagina of the mother expand at this time, so that normally there is no damage to the mother or the child.

The placenta and the membranes lining the inner walls of the womb are also passed out, soon after the baby. This is known as the "afterbirth".

Growing Up

A woman's ovaries produce the egg cells every month from the time she grows up, usually at about the age of

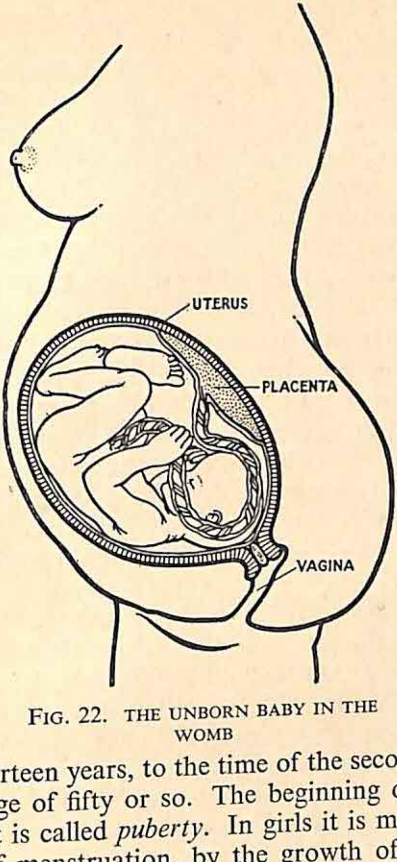


FIG. 22. THE UNBORN BABY IN THE WOMB

twelve or thirteen years, to the time of the second change of life at the age of fifty or so. The beginning of full sexual development is called *puberty*. In girls it is marked by the beginning of menstruation, by the growth of the breasts, widening of the hips and the growth of body hair. It is important that the girl's mother should warn her that menstruation may take place, otherwise she may be frightened and ashamed. The girl has now "grown up" physiologically speaking, but her mind will not reach maturity for some time. She now begins to take an interest in the attentions of men. Psychologically this is a difficult time, the child's mind being driven by a woman's body. This is mentioned again later.

A boy usually grows up at about the age of fourteen, later than the event in girls. The first sign is the occurrence of a "nocturnal emission" of semen. This usually takes place every month or so (it may be more often or much more seldom) until the boy marries, which may be many years later. The penis and testes grow in size, hair grows on the body, and the boy's voice "breaks".

There is nothing "unclean" about nocturnal emissions, unless the boy gets the habit of causing them to come on artificially. Artificial sexual stimulation is called *masturbation* (formerly called self-abuse). A certain amount of masturbation is now realized to be natural and harmless, but like anything else it should not be overdone. Parents or teachers do more harm than good by giving a child a sense of guilt about this habit. Masturbation is practised by girls to a lesser extent than by boys. Young children are also fond of handling their private parts. No notice should be taken of this unless it is done excessively, and even then the child should be only very gently encouraged to interest himself in other matters.

The male sex organ, the penis, is covered at its end by a fold of skin called the *foreskin*. If this should be too tight when the boy grows up, inflammation and irritation may result, and difficulty with the stiffening process during nocturnal emissions and sexual intercourse may arise. Boys should be told, just before the time of puberty, to draw back the foreskin, so that the penis grows through it. If this is not possible, the operation known as *circumcision* should be performed. This is done as a religious rite on all boy babies by Jews, Mohammedans and many Europeans, and soon after puberty by many African peoples.

The Sociology of Sex

Among human beings reproduction is not just the act of sexual intercourse and the birth of a baby. Reproduction is a whole series of events: courtship, marriage, founding a home, founding a family, care of the young, respect for motherhood, education of the child, handing on the traditions and customs to the next generation.

Many birds and animals care for and protect their young until they are old enough to fend for themselves. But man is far more than an animal. Marriage and family life has not only deep social roots, but also is of deep spiritual significance.

Humans have been described as sociological animals. Never does a man or a family exist merely for itself alone, but always as part of a larger society or community. Human societies would long since have ceased to exist if they did not attach very great importance to the matters affecting human reproduction, and in all types of society we find that there are religious or social sanctions and customs with regard to it. The reasons for this are:

(*a*) Reproduction always involves at least three people, the father, the mother and at least one child. It is therefore *not a personal matter*, but a social matter. Personal matters are things like eating, working, travelling. Sex is not like that.

(*b*) Society is concerned to see that it reproduces itself effectively, with the least disturbance in relationships between individuals, and with the greatest protection for the new generation.

In every society in the world today we find that some form of *marriage* and family life is the only socially recognized form of reproduction.

Marriage fulfils the requirements because the child is born into a *family*, with a mother to support it and a father to support both mother and child. Family life is itself very good physical, mental and social training for the growing child. Thus we see that the birth of illegitimate children, children born out of wedlock, is frowned on by society.

Anti-Social Sex Matters

For reasons already mentioned, society disapproves of any form of sexual intercourse except that of recognized marriages. Society also disapproves of all matters calculated to upset marriage solidarity, or family life. This disapproval may either take the form of regarding the matter as a *legal crime* punishable in the courts, or as a *civil offence*, or it may be regarded as a *religious sin* only, with no official interference.

The following are some of these anti-social acts:

1. *Adultery*. (Sexual intercourse by one of a married pair, with a third person. Also called marital unfaithfulness.) This is and always has been universally disapproved of because of its threat to family life. It is not a legal crime, however, in most countries. It may be used by the offended partner as grounds for divorce.

2. *Extra-marital Intercourse*. (Sexual intercourse between unmarried persons, fornication.) This is not approved of for the following reasons:

(*a*) The possibility of causing the birth of a baby without a family to live in or a father to support it (illegitimate birth).

(*b*) The possibility of the pregnancy forcing a marriage between two people who do not love each other.

(*c*) The risk of venereal disease.

(*d*) The awakening of sexual desire in unmarried women.

(*e*) The degradation of women. Good women lose the purity that they had hoped to consecrate to marriage, "bad" women are degraded still further.

(*f*) Men do not stand to lose so much, but this form of self-indulgence coarsens the moral fibre and lowers self-respect.

(*g*) If the two persons are genuinely intending to get married, and do in fact get married, this form of intercourse is not quite so frowned on by society. The great risk here as far as women are concerned is that they have no guarantee that the man will in fact marry them. If the man does not keep his promise the woman may suffer great mental stress (broken heart), and may even be psychologically damaged. *Pre*-marital intercourse, as it is called, conducted in an atmosphere of secrecy and in fear of pregnancy, may spoil, by setting up reflex inhibitions, the full enjoyment of sex communion in marriage later on.

In spite of its undesirability, extra-marital intercourse is actually neither a civil nor criminal offence. In some States of the U.S.A. it is a crime, but it is impossible to enforce the law. Among Christians fornication is forbidden; among Moslems it is permitted for men.

3. *Prostitution*. (The purchase or sale of sexual intercourse by money or gifts.) This has all the anti-social characteristics of extra-marital intercourse, as already outlined. In addition there is:

(*a*) A greatly increased risk of venereal disease.

(*b*) A far greater degradation of the sex act.

(*c*) A far greater degradation of womanhood. (Such women are called prostitutes, harlots or whores.)

Prostitution is, however, not illegal in most countries, but for a man to live on the earnings of a woman prostitute (such a man is called a pimp) is a serious crime.

In many countries it is also a crime to "solicit", i.e. to ask a woman to prostitute herself, or for a woman to offer herself in this way, in a public place.

4. *Incest*. Sexual intercourse between brother and sister, father and daughter, mother and son is a crime. Marriage between certain near relations is not permitted by law or the church. Marriage between persons of the same clan is not permitted in certain African societies.

5. *Rape*. Intercourse without the consent of the woman is a crime. It is also a crime to have complete intercourse with girls under the age of sixteen years, or with mentally defective women.

6. *Homosexuality* (sex play between persons of the same sex). Socially this is considered abnormal in the case of adults, and can be prosecuted as a crime if it takes place between adult male persons.

7. *Indecent exposure*. It is a crime for a man to show his private parts in the presence of a woman.

8. "*Crimen Injuria*." It is a crime for a man to watch or interfere with the privacy of girls.

9. *Abortion*. It is a crime to get rid of an unborn baby, whether carried out by the mother or another person.

10. *Infanticide*. The killing of new-born babies is naturally a serious crime.

11. *Concealment of birth*. All births, legitimate or illegitimate, alive or dead, must be reported to the authority. To fail to do so is a crime. (In some African rural areas this law does not apply.)

12. *Venereal disease*. Persons suffering from venereal disease may be compelled to undergo treatment.

13. *Activities which might over-stimulate sexual desire in the young*. Books, pictures, cinema shows, etc., which are "indecent", which degrade sex, or excite young people, are forbidden by law. Cinemas and theatres are controlled by the censorship system.

The Psychology of Sex

Freud was the first psychologist to draw our attention to the importance of the sex instinct (or sex drive) in our psychological make-up. We have already seen how important reproduction is to society; it is not to be wondered at that it has such an effect on our mental make-up.

This instinct does not occur in a simple form in adults, owing to the many restrictions placed by society on human sex habits. The instinct may therefore be buried, or turned into different channels, or it may be associated with feelings of guilt due to the way in which the person has been taught to control his sex feelings. Sexual drives are often found to be the unrecognized causes of many anxieties, emotional conflicts and frustrations.

The sex instinct is present in an undeveloped form in early infancy. The capacity to face real sex problems in later life may depend on what the child learns to associate with these early disguised feelings of sex.

The sex instinct probably consists of several elements:

(*a*) the desire for bodily pleasure, especially associated with the so-called "erotic zones" of the body, the mouth and the private parts.

(*b*) the desire to be loved and accepted.

(*c*) the desire to cherish, to love and protect others.

1. In *infancy* the baby experiences bodily pleasure in sucking, and in emptying his bowels and bladder. Later he acquires the sensation of comfort associated with mother-love. It is important at this stage that the comforting breast should not be refused, nor should disgust or punishment for "dirtiness" be associated with bowel or bladder movements.

2. In *early childhood* bodily pleasure may take on a more obviously sexual nature. Young children like to handle their private parts. This is usually quite harmless; if it is excessive it may indicate that the child feels the lack of maternal love.

Small children become strongly attached to their parents, often the parent of the opposite sex; thus the little boy may passionately love his mother and be jealous of his father, and vice-versa. This is normal provided it does not persist after puberty.

Quite early in childhood children show their capacity to cherish small objects such as dolls or kittens.

3. In *older children* bodily sexuality is not so obvious. There may be sex curiosity with regard to the anatomy of the opposite sex, and the physiology of reproduction. Such curiosity should be satisfied unemotionally by the parent, giving sufficient information to satisfy the curiosity without stimulating it. In primitive societies no problem arises in this connection, where sex and childbirth are open events.

There is often a transient "homosexual" period just before puberty. Boys usually prefer the company of other boys, rather than of girls, and vice-versa. There may also be the so-called "hero-worship" stage, i.e. the small boy may become emotionally attached to an older man, and a girl to an older woman.

4. *Puberty* is a time of drastic change, and brings many problems. It should be regarded with patience and understanding by parents and teachers.

The child is entering a new world, entering unexplored territory. He feels proud of his new-found status, but at the same time is fearful of his responsibilities. He feels compelled to act in an adult manner, but his only experience so far is of childhood. Thus we have conflicting situations such as:

(*a*) The desire for independence *vs.* the desire for parental shelter and care.

(*b*) The desire for sexual experience (or to be admired by the opposite sex) *vs.* the fear of doing anything socially taboo.

(*c*) The desire to be accepted by society *vs.* lack of self-confidence.

Puberty and adolescence should be a time when the child frees himself from parental love and learns to stand on his own feet, accepting responsibility for his own actions.

5. In *adults* psychological difficulties may interfere with normal sex life. These difficulties are nearly always due to the persistence of childhood attitudes. Some of these difficulties are:

(*a*) Excessive attachment to the parent of the opposite sex, boy to mother, or girl to father. This may either prevent their marriage, or interfere with successful adjustment to their partner in marriage.

(*b*) Homosexual attachments may persist, so that the person is unable to love anyone of the opposite sex.

(*c*) Excessive guilt feelings associated with the private parts may interfere with sex life.

(*d*) Excessive masturbation, due to the continuation of infantile self-love, may prevent satisfactory sex life.

(*e*) Continuation of the puberty fear of sex; in women the fear of pregnancy, in men the fear of impotence.

The normal adult faces sex with an "adult" or mature attitude, realizing its place in his life as something natural, yet something important, and realizing his responsibilities to himself and to society as a whole.

Sex Problems of Unmarried People

In former times, in Christian society, it was assumed that unmarried people should not be troubled by sex problems; that they must put all thoughts of sex out of their heads until they were married; that interest in sexual matters was "dirty" or "impure". It is now realized that it is much better for young people to face up to the fact that they have sexual desires, and to recognize that it is entirely natural. The problems that arise can then be dealt with far more effectively than if the whole matter is shunned as something which decent people should not think about.

It is natural for young people to desire and seek the company of the opposite sex, and there should be, in any society, facilities for this to take place. This is the only way in which they can prepare themselves for the task of choosing a partner for life later on.

There is also a desire for bodily contact. An opportunity for this occurs in the ballroom type of dancing. There may be a desire for more intimate contact, as in kissing, embracing, and the more advanced forms of sex-play short of intercourse, e.g. "petting" (American) and "metcha" (Bantu). These may be harmless in themselves, especially if they take place during genuine courtship, but if indulged in too freely it may lead on to the desire for complete intercourse, which is a far more serious matter.

In young men the desire for complete sexual intercourse usually occurs sooner or later. The desire may be strong in some, others are hardly troubled by it. The aim should be to postpone full sex experience until it can be shared with the woman of choice for life.

Where sex desire is a problem the man should attempt to reduce it. He should avoid situations leading to temptations, and should try to exercise self-control. He should also remember to have a respect for all girls, in the knowledge that they are the mothers of the future generation and must be kept pure for this task.

It is often thought by ignorant persons that occasional sexual intercourse is necessary, in the belief that otherwise they may find themselves impotent when they come to marry. This idea is quite false. In both men and women nature keeps the sex organs functioning efficiently before marriage. In men the "nocturnal emissions", which take place naturally, are a sign that satisfactory sexual intercourse will be possible later on.

It is sometimes asked, "What is the harm in sexual intercourse? Why is it forbidden to unmarried people?" Nowadays it is not sufficient to say that it is "immoral", that it is a "sin". Young people need to know why, and we must be prepared to answer them. Some of the answers have already been given under the heading of "Extra-marital intercourse". In addition to the anti-social aspects, such as illegitimate births, venereal disease, and degradation of womanhood, the following should be stressed:

(*a*) The cruelty of seducing a good girl from the path of virtue.

(*b*) The psychological damage to the sense of self-respect; the disgust, self-reproach and sense of guilt that may follow and wreck future married happiness.

(*c*) The risk of a forced marriage with a woman unsuitable as a wife.

Among young unmarried *women* sexual desire, as such, is usually not strongly felt. Their desire is for a family, a home, and for love and respect. Women have a much greater sense of responsibility towards the sex act, realizing more fully its importance and implications. Young women, if they give in to this temptation, usually do so in the first instance, not because of their own sexual desire, but because they wish to please the man whom they think is in love with them. That is to say, it is usually a case of foolish sentiment, rather than a case of lustful desire, when a young unmarried girl first permits sexual intercourse. Yet nature and society punish her far more severely than they do the man. If she has a child she is "ruined" for life, and is regarded as a social outcast, while the man who is the father, the cause of her downfall, may be able to escape free, or at the worst be forced to marry her.

Women are far more sensitive to the psychological aspect of sex than are men. The sex act to them is always associated with strong emotional feelings. Quite apart from the risks of pregnancy and venereal disease, women realize the risk of psychological damage should their lover prove to have no serious intentions.

Many women do not desire to marry, others may not have the chance to. In such cases their desires are often successfully "sublimated" into other channels, particularly in careers where they can look after others, for example nursing or teaching. Unmarried women who feel a sense of frustration may be well advised to try to give their services to society in these very useful and essential ways.

Marriage and Family Life

Marriage must be permanent, with mutual trust and faithfulness between husband and wife. Anything that threatens the solidarity of marriage is anti-social: unfaithfulness, easy divorce, etc. Where marriages are not firm, where the parents quarrel, where there is not an atmosphere of peace and love, such marriages do great harm to the mind of the growing child, and, if in excessive numbers, would destroy society itself.

Marriage between close relations or between brother and sister has never been successful, and no society surviving to the present time permits it.

Choosing a Life Partner

Marriage has at least two objects: (*a*) Companionship, (*b*) Parenthood.

The marriage partner should be chosen with both these aims in mind. The following are some of the points to be considered:

(i) Both partners should be of a similar cultural and intellectual standard, as regards interests, education, and home background.

(ii) Both partners should preferably be of the same religious and political views, if these are strongly held.

(iii) Both partners should be mentally and physically healthy, and should attract each other sexually.

(iv) Both partners should desire children, and have similar views on family planning. They should also have similar views on the upbringing and education of children.

(v) Both partners should understand the biological aspects of sexual intercourse.

(vi) Both partners should enter marriage with the serious intent of making it a permanent union, based on mutual love and respect.

(vii) Both partners should have a sense of responsibility about the home, its finances, and its stability.

Love

Love is the cement which binds marriage. Love means committing oneself to the chosen one for life. Love means *giving*, not taking. Love includes the intimacy and tenderness of sexual union, and much more besides. Love must be mutual, the one for the other, and not one-sided. It implies complete loyalty, full mutual trust and confidence, mutual respect and a firm and lasting partnership.

True love is not "conditional", it does not depend on what a person is or does. A true lover cannot say, "I love you on condition you prove to be fertile" (or remain beautiful, or rich, or successful, or whatever is it). On the contrary he (or she) says, "I love you because you are you" (rich or poor, sick or well, beautiful or ugly, good or sinful, barren or fertile).

Married love will be firmer, and mutual trust deeper, if the two partners have never previously had sexual experience with any outsiders. The realms of sexual love will then be explored together, its joys discovered together, as a deep, moving and binding experience.

Homemaking

The husband should be able to support the wife and family in the way she has been led to expect. He should be faithful, reliable, tender and affectionate through all the ups and downs of life together.

The wife needs to be a good housekeeper, cook, bookkeeper, nurse, teacher and hostess. It is the woman who sets the tone and character of the home, and it is the mother who most influences the development of the children. A good wife is a great help to a husband and a good mother will have good, healthy and successful children. The woman's influence in the home, if used wisely, tactfully and discreetly, can be a tremendous power for good.

Good housewives know the importance of good cooking; it is said that the way to a man's heart is through his stomach! Good housewives should, for the sake of their husband's and children's health, understand the laws of nutrition. They should practise in their homes all the laws of hygiene, being particularly concerned with nutrition, cleanliness and fresh air. The wife should see that her husband and family have opportunities for wholesome recreation during leisure time, and at night she sees that they have comfortable and refreshing sleep.

Family Planning (Birth Control or Contraception)

Among better-educated and more intelligent married couples some sort of limitation of the size of their families is nowadays usually undertaken. The reasons for this are:

(*a*) If babies arrive too often it is not good for the mother's health.

(*b*) Small children need a great deal of attention if they are to be kept healthy, and this is not possible if a new baby arrives to occupy the mother's time and energy.

(*c*) Parents may wish to give their children a good start in life by providing the best food, clothing, living conditions and education. This may not be possible if there are more children than the father's income can provide for.

Statistics show that children of medium-sized families are usually healthier in body and mind than children of large families. On the other hand, an only child is often also not as fit as are those with a few brothers or sisters.

From a public health point of view family limitation is important because:

(*a*) Child welfare is difficult or impossible without it.

(*b*) Overcrowding, insanitary conditions and slums occur where the poor have large families. Disease is consequently more rife.

(*c*) Malnutrition is more common where there are large families.

Looking at the matter from a social point of view, the rapid growth of population which has followed improved public health and medical measures has brought other problems in the shape of economic insufficiency and political unrest. In the old days disease and warfare kept the population down to the size that the land could support. Nowadays we must rely on family limitation for the same result.

Methods of Family Planning

There are several ways of ensuring that the mother of the family does not again become pregnant without wishing it. These are:

(a) *Abstinence*. Clearly if sexual intercourse does not take place then no birth will follow. However, the strength of sexual desire between persons in love and living together makes this extremely difficult; one or both partners may find the strain excessive.

(b) *The Safe Period or Rhythm Method.* Conception is most likely to take place during the middle seven days of the menstrual month, which is the time the ovum leaves the ovary (ovulation). Intercourse at other times is not so likely to lead to pregnancy. For greater safety the middle two weeks should be avoided.

This method is not entirely reliable, but when practised by whole communities (as in some parts of India) the total number of births is reduced.

It is especially unsatisfactory in women with irregular menstrual cycles, though the time of ovulation in such cases may be predicted by taking the temperature daily.

(c) *Artificial Methods*. These consist of applications used either by the husband or wife with the object of preventing the sperms from entering the uterus.

Details of methods of family planning may usually be obtained from the doctor in charge of an infant welfare centre or from a private practitioner.

All methods of family planning require (*a*) intelligence, (*b*) personal hygiene, and, in the case of artificial methods, (*c*) money. Unfortunately the very section of the population most in need of family limitation from a health and social point of view are the ones most lacking in these three requirements.

Under conditions of polygamy it was possible for each wife to space her children widely so that neither their health nor hers suffered in consequence. This was therefore, in a sense, a form of family planning. However, the well-known psychological and social disturbances which occur under conditions of polygamy far outweigh its possibilities in this respect. The practice of refraining from intercourse until the child is fully weaned, i.e. for eighteen months to two years, is, however, highly commendable. There is no truth in the belief that a woman cannot become pregnant if intercourse takes place while she is still breast-feeding the previous baby.

Infertility (Sterility)

The inability to have children occurs in at least one out of every seven marriages.

The fault may be on the part of either the husband or the wife. The doctor will need to examine both partners in order to discover which of the two needs treatment.

Modern medical methods have made the possibility of cure more definite.

The usual causes of this condition are:

(i) *Immaturity*. Failure of the sex glands or organs to develop properly.

(ii) *Incompatibility*. The egg and sperm are not able to join satisfactorily, or if they join the embryo does not grow properly.

(iii) *Blockage*. The egg tubes or sperm tubes may be blocked by inflammatory disease. The venereal disease known as gonorrhoea is the commonest cause of this.

Pregnancy and Infant Care

Signs of Pregnancy. The first sign of pregnancy is the ceasing of the menstrual periods. There may be feelings of nausea in the mornings, and faintness by day. The breasts begin activity, and this may be felt by the woman quite early in pregnancy. The abdomen is visibly swollen by about the fifth month.

Duration of Pregnancy. Pregnancy usually lasts for ten menstrual months. The baby is born when the tenth missed period would have been due. For women with a 28-day month, the baby should come 280 days, or ten lunar months, or nine calendar months plus seven days, after the first day of the last period.

Hygiene of Pregnancy

(a) *Nutrition*. The baby's nourishment begins long before birth. The expectant mother should eat nourishing foods during pregnancy, especially *milk* and *meat* for protein and calcium, and *fruit* and *vegetables* for vitamins and roughage.

(b) *Water* should be drunk in extra quantities to keep the kidneys washed out.

(c) *Exercise* is necessary so that the mother keeps fit. Exercise should not be too violent; running or horseback riding should be avoided.

(d) *Clothing* should be loose round the abdomen, breasts and legs.

(e) *Medical Supervision.* Expectant mothers should attend at an ante-natal clinic, to make sure that they and the baby are well, and that labour will be without difficulty. Doctors often advise mothers having a baby for the first time to come into hospital. Also all those in whom there is the possibility of a difficult time, and those living in remote areas far from help, should come in.

Labour

Signs of the onset of labour. Abdominal pains begin to come on at regular intervals. There may be a little loss of blood. The "waters" may burst out.

The *confinement* should take place in a clean room, with clean bedding. Surplus furniture should be removed. If possible only a properly trained midwife should conduct the delivery.

The first pains are due to the opening of the mouth of the womb. These last several hours. The mother should not try to strain down at this stage, but should wait for the *second* lot of pains. These are accompanied by the desire to push down, and result in the baby being born. After about half an hour the *afterbirth* is born.

Those in attendance should not interfere with the process of birth. Their hands and clothes must be clean. There should be a plentiful supply of Dettol water (or similar antiseptic) for washing the mother and child.

Danger signs

1. Excessive bleeding.
2. Second type pains with no progress being made.
3. Failure of the afterbirth to come away.
4. Fever occurring several days later.

Care of the Baby

1. The *cord.* The umbilical cord should be tied with boiled string and then cut beyond the tie with clean scissors and a clean dressing applied.

2. The *eyes.* Mild disinfectant drops should be put in the baby's eyes as soon as it is born.

3. *Warmth.* If the weather is cold the baby should be wrapped in a woollen (real flannel) garment. The baby's napkin should be frequently changed in cold weather, otherwise the wetness may chill the baby.

4. *Sleep.* Small babies sleep almost all the time. At night they should sleep in a separate cot or box, otherwise there is a danger of suffocation by the mother. The window should be open, but the baby should not be in its draught.

5. *Feeding.* Mothers should try to teach their babies to feed only at regular intervals. This may be every two hours at first, later every three or even four hours. Regular feeding is good for the baby's stomach, and good for the mother's breasts. Babies need not be put to the breast merely because they cry; they may be crying because of wind in the stomach, or because they are wet and uncomfortable.

On the other hand, babies should not be kept from the breast merely because it is not their meal-time, as was formerly the European custom. Babies soon fall into a regular habit if encouraged to do so early enough.

In hot weather babies may need extra water. This should first be boiled, unless taken from a municipal tap.

It is important that babies should be given *enough* milk. If the mother's breasts are empty (but not otherwise) a *supplementary* feed may be given. This may be made from boiled cow's milk; goat's or sheep's milk may be used; asses' milk is also very good. Or the feed may be made by mixing dried milk and boiled water.

Breast feeding should never be given up without doctor's advice. A mother's breast milk can *never* poison her child.

It sometimes happens that the mother's milk supply fails, especially if she herself is sick. If this happens *artificial* feeding must be done. Artificial feeds must be made of protein of some sort (e.g. milk), not of starchy foods such as flour water or any sort of cooked porridge, at least until the sixth month.

Cow, goat or sheep or asses' milk may be used. It should be boiled first, and cooled. For very small babies a little boiled water may be added. It must all be used at once (the mother or another child can drink what is left over) because it may start growing disease germs if kept for more than a few hours, except in cold weather or at night. If kept, it must be covered to prevent flies getting in and dirtying it.

Dried milk is more convenient but more expensive. Follow the instructions on the tin, or use one part of powder to four parts of water. It may be given as a thick cream in a spoon followed by boiled water from a bottle.

If nothing else is available the baby may be given raw egg to drink, mixing the contents of one egg with an equal quantity of boiled and cooled water and a teaspoon of sugar.

The quantity of milk required by the baby can be roughly calculated as follows: a baby should be able to drink at one meal half its weight in fluid ounces. If the baby weighs eight pounds, then it will drink at least four fluid ounces of milk five or six times in twenty-four hours. A sixteen-pound baby will drink eight fluid ounces. Babies less than three months old often need more than this formula suggests, however.

If a medicine or other type of bottle is being used as a feeding bottle, its volume can usually be read on the label or on the bottom. A glass or mug is usually eight ounces, an ordinary teacup four ounces. An Imperial pint is twenty ounces and an American pint is sixteen ounces.

When a baby is being artificially fed it is essential to give him extra vitamins, particularly vitamin D in fish oil, and C in fruit juice—a teaspoon of each per day.

The baby should gradually be *weaned* at about six months, by being fed from a spoon. At first only one spoonful of solid food is given at each meal. This is gradually increased every week, and is in addition to (not instead of) the breast or artificial milk.

The solid food may be (1) a cream made from dried milk, (2) thick milk, (3) soft yolk of egg, (4) "Incumbe" or similar bought food, (5) Maizena (cornflour) made with milk, (6) thin porridge made with milk, or other similar things. (7) Fruit and vegetables are also very good, but they must be made smooth by being passed through a fine sieve first. A mixture of cooked soya bean and raw banana, sieved, is very good. (8) Sieved meat or liver is excellent.

Babies must not be fed on vegetables alone, nor on starch alone.

Coarser food may be given after the ninth month, e.g. ordinary porridge, chopped vegetables and meat.

Milk is essential for all young children. If other milk is not obtainable the mother should continue to provide it for at least eighteen months.

Never forcibly make a child eat as this may cause choking, leading to bronchitis or pneumonia. Do not let a small child cry while eating as this may have the same effect.

When the mother's milk is finally discontinued, the child must be given protein either as milk or meat, otherwise serious malnutrition may occur.

Points to remember about infant feeding.

1. The food must be perfectly clean, freshly boiled.
2. The food must not be rough (i.e. no coarse vegetables or porridge).
3. The food must contain protein.
4. Small babies must not be given starch or solid food.

Child Welfare

Since reproduction is, in the end, the most important function of any society, it is natural that society should be concerned to see that all new babies born into it have every chance of survival, and grow into strong and healthy adult members of the community.

Until recent times it was always assumed that the mother, or both parents, were naturally or instinctively fitted to do all that is necessary for the welfare of their children, within the limits of their financial circumstances. But it is now realized that a tremendous amount of death and disability is due to sheer ignorance and neglect, not to poverty alone. Society tries to counteract this in the following ways:

1. Provision of ante-natal care, the care and instruction of expectant mothers.

2. Midwifery services, the attendance of skilled midwives at births to prevent injury to mother or child.

3. Infant welfare services (sometimes called "well-baby" services).

4. Crèches, or day-nurseries, in which pre-school children can be cared for, especially children of working mothers.

5. School Health Services, as described later in this book.

6. Instruction in mothercraft for girls at school.

7. Marriage guidance councils, whose object is to keep married persons, and families, happy and stable.

Of these we shall discuss only Infant Welfare and Crèches.

Infant Welfare. The first year of life is the most dangerous year of life. A tremendous number of children never even see their first birthday. Among Africans, particularly tribal Africans, it is probable that at least a quarter of all the children born die in the first few years. The fact that in England, and other Western European countries, only 3 or 4 per cent of babies die, shows that most of these deaths among African babies are preventable.

The commonest causes of death in infancy are:

(*a*) Pneumonia, either ordinary pneumonia, or the type that may follow on whooping cough or measles.

(*b*) Diarrhoea and vomiting, due to eating unsuitable or dirty food.

(*c*) Accidents, particularly suffocations and burns.

(*d*) Congenital syphilis, from the mother.

(*e*) Tuberculosis, from parents or other people in the house.

(*f*) Birth injuries, especially when the head is damaged.

(*g*) Malnutrition, especially lack of protein due to insufficient milk supply.

It is the object of Infant Welfare schemes to prevent these deaths.

Infant Welfare schemes are run either by the Municipal Health Department on behalf of the community, or by voluntary members of a Child Welfare Association. There is usually a central "clinic" where mothers and babies come, which is either staffed by trained nurses or by educated and experienced voluntary lady workers. There may also be "health visitors", who are usually nurses with public health training, and who visit all new babies in their homes.

The work of the Infant Welfare scheme includes the following:

(a) *Supervision of the* **health** *of the babies.* The most important thing is to weigh the babies to see that they are growing properly. For the first six months weighing is done weekly, later monthly. The general health is also noted, the presence of cough, diarrhoea, sores, etc. The Infant Welfare workers only give the simplest of treatment, such as that which any educated mother would give. Any real sickness is dealt with either by a visiting doctor, or by sending the child to a doctor or to hospital.

(b) *Supervision of the* **feeding** *of babies.* The mothers are taught the best ways to feed the baby, the time and regularity of feeds, when to wean and what solid food to use, etc.

Breast feeding is always strongly encouraged, but where extra milk is required mothers are taught how to make up the feeds, how to keep the bottles pure, etc. In many clinics extra food is given out, especially to the small children who have been weaned from the mother's breast. Such children are usually given extra protein, fat and vitamins, for example, in the form of sour milk, dried milk, fish liver-oil, fruit juice, yeast tablets, etc.

(c) *Supervision of the* **care** *of the babies.* Instruction is given with regard to the dressing, bathing and training of the babies. Mothers are taught how to make simple garments and how to dress the baby according to the weather.

(d) *Protection of the health of the babies by* **immunization.** In most countries the Public Health Authorities provide the following free of charge:

1. Diphtheria immunization (two injections).
2. Whooping cough (two or three injections). (These two are often done at the same time.)

3. Smallpox vaccination.
4. Yellow fever vaccination (in tropical areas).

Usually a medical officer visits the clinic and immunizes all those who have come for it.

Crèches or Day-nurseries. In the past, mothers who had to go out to work all day used to leave their babies with grannies or neighbours who were often careless and ignorant. It is far better to leave them in the care of properly trained women at a crèche, where they are at least kept in safety and given good food and extra sleep. A certain amount of habit training is also done.

Crèches cannot take the place of a mother. A child in a crèche naturally cannot get the individual attention it requires, and it especially lacks the personal loving care its mother can give, but it is certainly better than the care provided by some of the neighbours or aunties which might be the mother's only other choice.

Crèches are usually organized by voluntary societies. Large factories may run their own crèches for the babies of women working there.

Chapter Seven

THE MIND AND ITS CARE

Not many people realize that disorders of the mind are the commonest of all illnesses. We are used to people with sick bodies; we know what sickness of the body looks like and feels like. But few of us stop to think what the sick mind is like. We can only know what is going on in our own minds, we cannot see the workings of the minds in other people—except when they get seriously out of order, and then the poor sufferer is usually led away to a mental hospital, and we don't hear of him again and soon forget him.

What goes on in other people's minds does, however, affect us; and what goes on in our own minds does affect other people; and each one of us is of course affected by what goes on in our own minds too. The peace and happiness in a family depends on the "mental atmosphere" formed by the workings of the minds of its members, particularly the parents. In a factory the mental attitudes of the workers and employers can mean on the one hand contentment, productivity and prosperity, or on the other industrial strife and distrust. In the school some teachers seem to radiate enthusiasm and peace, other teachers create discord and behaviour problems.

A healthy mind is one which makes for peace and harmony; the unhealthy mind is one that makes for discontent and uncertainty. If this is multiplied a few million times you can see how important mental health is, not merely for you and me, but for the peace of the whole world.

The Healthy Mind

We can all recognize the man with a healthy mind. We respect him and trust him and wish that we were like him. We feel comfortable and at ease in his presence. He is tolerant of human weaknesses, he always thinks well of other people if he possibly can.

If we are in trouble he will help us and expect no reward. If he needs help from us he can ask for, and receive it, without loss of dignity. He may be rich or poor but he is content with what he has and spends his money wisely, thinking of the future.

He may be ambitious but he knows his limitations, and so avoids frustration. He uses such talents as he has, for the benefit of himself, his family, and the community in which he lives.

When failure or disappointment comes his way, he meets it calmly and soon overcomes it; if he is to blame, he does not try to blame others; if he has made a mistake, he resolves to try to do better in future. If he is successful, he does not get an exaggerated idea of his importance, and does not belittle other people.

He is a faithful friend and a loyal servant. He is slow to anger, but if it is necessary, he can use force to defend what he thinks is right. He is slow to find fault with others and is quick to forgive those who wrong him. He is careful not to hurt the feelings of others. He tries to keep his mind free from evil thoughts, hatred, jealousy, spitefulness, greed.

He can look into his own mind and understand how it is working. He can concentrate his thoughts on particular problems. He can forget what are merely unhappy memories. He can control his emotions so that he is never overcome by sorrow, anger or lust.

If circumstances change, if he finds himself in new surroundings, he can quickly adjust himself to a new way of life. Though he respects old customs, he does not feel bound by them.

His way of living and behaviour are consistent. His friends know that they can rely on him. He is not likely to do anything unusual or eccentric, especially if such action would cause dismay to others.

He has strong personal beliefs which give him strength in time of need. He does not easily change his mind, but is willing to do so if shown that he has been wrong.

He enjoys the company of others, but does not mind being left alone. He feels a sense of duty towards other people, but does not expect too much from them in return.

He usually has satisfying work, work which interests him. If not, he has a wholesome hobby for his spare time. He feels secure about the future in the knowledge that he has taken all reasonable precautions to safeguard it where humanly possible. Where circumstances are beyond human control, he does not rail against fate.

He does not unduly worry about his business or domestic affairs. He is not likely to do anything rash, thoughtless or selfish which might jeopardize them.

It will be seen from this long list—a list that no doubt looks like a counsel of perfection—that mental health is mostly a matter of balance. The man with a healthy mind steers a middle course, not flying to extremes on one side or the other. He knows where he is going, he has control over the workings of his mind. He is adaptable and open-minded, however. His mind can be described as "elastic", it may be stretched by adversity but resumes its shape afterwards. Like a tennis ball, it can receive a blow and yet not break, on the contrary it bounces back as fit as ever.

The Healthy Mind in Childhood

The child with a healthy mind is equally easy to recognize. He is not necessarily teacher's favourite—being a favourite may damage a child's mind—but he is usually well liked both by adults and children. He has a pleasing personality.

He plays happily with other children, but can also amuse himself.

He can talk freely to his teachers or other adults, yet without being too familiar.

He enjoys the company of his parents, and likes his home, but is not unduly distressed if away from home for a short time. He can talk freely and familiarly to his parents.

He appears to enjoy life, whether it is school or games. He usually has a hobby or special interest.

He likes to be independent of help from others, but does not get discouraged unduly when he cannot do things for himself.

He does not worry excessively about his work or the future. He sleeps well, and looks calm and confident.

The Unhealthy Mind

The unhealthy mind is often more difficult to recognize. Just because we happen to like or dislike a person it does not tell us whether his mind is healthy or not. It may be some quite trivial thing that attracts, or irritates, us.

There are all degrees of mental ill-health, from mild impatience or worry to severe madness. Most people have to deal every day with minor attacks on their mental peace, and we banish unhealthy thoughts from our brains as easily as we brush flies off our food. But just as some people are born with or develop weak bodies, so some people are born with or develop weak minds, through no fault of their own. But, we must also remember that, just as there are some people who let their bodies get dirty or weak, so there are some people who let their minds become a painful burden to themselves and others.

Here are some of the more obvious signs of mental ill-health.

1. Lack of Self-control

Bad temper. Those who cannot keep their tempers, who get angry easily, who give offence easily, and do not care for other people's feelings.

Ill disposition. Those who harbour jealousies, and nurse hatreds; those who squash enthusiasm and dampen ardour;

those who gossip about slanderous things, or who "spread false witness", as the Bible says.

Immorality. There are those who are greedy for money or power; those who lust after the sensations of sex; those who do not respect other people's rights or property.

Misfits. Those who seem unable to fit into society, the tramps, the criminals, or those who cannot face life unless drugged with alcohol, or harmful drugs.

Over-emotionalism. Less objectionable, but equally unhealthy, are those who give way excessively to sorrow and self-pity when disappointment comes their way. Children do not control their emotions very well, and in them such a thing is not serious. They can grow out of it. But when adults behave in that way it is a sign that their minds are immature, that their minds have not grown up.

2. Maladjustments

Inferiority. This is a very common failing. Almost all of us, at some time or other, feel that we are too weak, too incompetent, to face life. Certainly it is better to think too little of one's self than to think too much of one's self. But the person who, without good reason, refuses to try to do his best, the "poor little me" attitude, has an unhealthy mind.

Some people disguise their feeling of inferiority by a show of aggressiveness; they "over-compensate" it. For example, the weak little man at work may bully his wife and children at home.

Dependence. This is very similar to inferiority. Dependent people retain a childlike attitude, leaning on others for support. They are followers, never leaders. They are hangers-on, or "yes men", always agreeing with others, never having an original idea of their own.

Dependence may also be disguised or hidden by those ashamed of it, and here again a show of aggressiveness may be used. An over-compensated dependent man may be the type that scorns to take advice, never allows any show of softness or "weakness" in himself, complains against authority, or if in authority, often acts in a bullying manner offensive to those under him.

Loneliness. Also similar to the feelings of inferiority is the feeling of loneliness, the "nobody-loves-me" attitude. We find this especially in people who have had overprotective parents, and who are then left to face the harsh realities of the world alone. These people expect others to be friendly with them, yet never try to be friendly to others in the first instance.

"*Grumpiness*". These are the people who admit no joy in life, nothing interests them, nothing amuses them. They are grousers, grumblers, and complainers.

Irritability. Such a person gets angry over seemingly trivial matters. Usually it is because he has been "touched on a sore spot", for example when reminded, unintentionally, of a defect in his character. Irritable people cannot stand being teased. Some people get irritated when they cannot have their own way. Others are irritated by incompetence or slowness in others.

3. Suggestibility

This means that a person is excessively liable to agree with suggestions put to him by other people. Children are very suggestible, and we must be very careful only to suggest good thoughts to them. Teachers, for instance, can suggest that keeping the class-room tidy is great fun; the children become enthusiastic about their classroom and do actually enjoy keeping it tidy.

Adults have less suggestibility, but we all welcome it when it suits us. We like others to tell us that our holiday is going to be enjoyable, for example. Usually it is actually more enjoyable then, than if we had thought we were not going to enjoy it. Doctors always try to suggest to their patients that they are getting better, because this does really improve the patient's resistance to the disease. On the other hand, a person who thinks he is going to die may hasten his end.

Suggestibility is harmful when a person has been unduly influenced in an unpleasant way by another person. Many a marriage has been wrecked because the parents of one partner have suggested that the other was unsuitable. Some parents ruin their child's health permanently by too much care, suggesting to the child that he is "not strong". Married women have sometimes found themselves unable to experience the joys of sex communion with their husbands, and the cause has been that their own mothers lead them to think of sex as "disgusting".

Parents and teachers have a particularly great responsibility to see that unhealthy suggestions are not put into children's minds. As the Bible says, we must be careful not to "cause their feet to stumble".

Suggestible people are easily influenced by false propaganda, and become the victims of political agitators, or unscrupulous advertisers.

People who are the victims of so-called witchcraft are suggestible. They believe they have been bewitched, and that they will die, or fail their exams, or whatever it is, and it does so happen. The efficiency of "love charms" and other "spells" of a similar nature, can probably be explained in the same way, especially if the victim subconsciously is only too willing to be charmed.

(Since this is the only place in the book where witchcraft is mentioned, we may digress for a paragraph to draw attention to the other type of witchcraft, so common in Africa, where an innocent person is accused of having bewitched someone; for example, a mother may be accused of having bewitched her child, should it happen to die. While deliberate suggestion, of the kind mentioned above, can sometimes do harm to suggestible people, innocent or non-deliberate bewitching is not possible. No person can unintentionally bewitch or harm another person in any way whatsoever.)

4. Neurosis, Neurotic Behaviour

A neurotic condition is an undesirable emotional state, which seems unreasonable and is uncontrollable. The common types of neurosis are anxiety, obsessions, hysteria, excessive feelings of guilt, unreasonable fears, shyness, imaginary illness.

People suffering from neurosis fall into such a state because it is often simpler and more convenient than facing up to life's problems bravely and cheerfully. Many of them are therefore difficult to cure.

Anxiety (anxiety neurosis). It is natural for us to be anxious at times, but some people are anxious at times when there is no reason for anxiety. In some cases they do not know what it is that is worrying them, in other cases they have unreasonable fear of, say, crowded places, or locked doors (phobias). Sometimes they fear that they are going to fail to do their work properly. Such people may suddenly give up what they are doing and perhaps cry like a child that cannot get his way. They are then said to have had a "nervous breakdown". Others may suddenly lose their memory, and wander from home not knowing who they are or where they live.

People who suffer from even mild anxiety often find that their body is affected too. They may have indigestion, high blood pressure, shortness of breath. They usually cannot sleep well. There may be sexual difficulties, impotence in men, and frigidity in women.

Obsessions (obsessional neurosis). Sufferers from this form of neurosis feel driven by a power outside themselves. In mild cases it may take the form of living according to fixed habits. They may have fixed ideas about the way things should be done, and so may make family life miserable by insistence on certain things. Some people may feel compelled to keep doing unreasonable acts. They may feel they must keep washing their hands, or perform some other ritual of some sort. They may feel that "bad luck" will occur to them if they fail to carry out these particular actions.

Hysteria. This takes the form of some bodily weakness which permits the person to "escape" from an unpleasant psychological situation. A soldier may be "blinded" by the explosion of a shell; a woman who has an unsympathetic husband may develop a "weak heart"; a student, whose relations are expecting him to pass his exams and bring credit to the family, gets some convenient sickness. Those suffering do not realize the cause; they are not shamming, or putting it on (malingering). Often the doctor does not suspect what has happened. But it shows how an unhealthy mind can seize on, and take advantage of, a body that is temporarily unhealthy.

5. Morbid Disposition (Psychopathic Personality)

There are many kinds of this form of mental ill-health, which, though not necessarily serious in themselves, may eventually seriously damage the mind. Some of these morbid dispositions are:

The brooders. Those who nurse grievances or imagine slights; those who cannot forgive an injury; those who cannot recover from disappointment or thwarted ambition.

The suspicious. Those who always imagine that other people are their enemies.

The secretive. Those who cannot be open and honest about themselves and their intentions.

The sensitive. Those who are unduly offended by real or imagined blows to their pride.

The solitary. Those who do not desire the company of others at any time, and who cannot mix well with society.

The depressed. Those who are unable to lift off the burdens of unhappiness. Not to be confused with the grousers who grouse because they like grousing; this type of depressed person is really miserable.

The irresponsible. Those who will not take responsibility and are unreliable and unpredictable.

6. Mental Deficiency (mental defectiveness, feeble-mindedness, idiocy, imbecility).

These are various forms of lack of intelligence, the ability to reason or understand. They are discussed more fully on pages 173 and 178.

7. Insanity (Psychosis)

This is mental ill-health so severe as to interfere with the person's normal life. It may take many forms:

Melancholia or Depression. Very severe and unreasonable anxiety, fear or sorrow.

Mania. The brain is full of masses of confused thoughts.

Split-personality. Withdrawal into a world of the imagination, becoming "another person".

Hallucinations. Seeing visions or hearing "voices".

Delusions. False ideas, e.g. the delusion of possessing great wealth, or the delusion that someone is trying to kill you.

Many forms of insanity seem to be unpreventable, but other kinds, even when the mental constitution is predisposed to it, could be prevented by proper handling and encouragement in childhood. Other rare forms of insanity are due to concrete occurrences outside the mind itself, for example, such things as syphilis, alcohol, head injuries, lack of vitamin B, excess or lack of thyroid gland, childbirth, and other things.

People suffering from insanity usually need to be looked after in a mental hospital, for their own good, or for the protection of others. Some forms of insanity are curable, others are not.

The Unhealthy Mind in Childhood

Any observant parent or teacher should be able to recognize when a child is suffering from mental ill-health. The child does not talk about himself, he does not describe his worries, but it is often obvious that something is wrong, that his mind has been hurt, because it will be seen that his *behaviour* has changed. In other cases the mental upset is not noticed, and not cured, and persists into adult life.

The causes of damage to children's minds are discussed later (page 178), but a brief list of some of the things that may be noticed, is as follows:

Young children. Fear of the dark, fear of being left alone, refusal to open the bowels, stuttering, excessive masturbation, lack of appetite, thumb sucking, temper tantrums, trying to attract attention.

Older children. Quietness, solitariness, relapse to babyish ways, bullying, naughtiness, sleeplessness, miserableness, tremblings, nightmares, nail-biting, lack of appetite, refusal to play, destructiveness, criminality, bed-wetting, failure to progress at school, lack of interest in lessons.

It does not mean that any *one* of these items indicates mental ill-health, but several together may be suspicious.

It is most important that children's mental disturbances should be treated or relieved as soon as possible, otherwise permanent damage may result. Prevention and treatment is discussed on page 178.

The Working of the Mind

Physiology is the study of the workings of the body, including the brain and nervous system. *Psychology* is the study of the workings of the mind. Whole libraries of books have been written about psychology, so we can only very lightly touch on the subject here, sufficiently perhaps to interest the reader so that he will study the matter more fully in other books.

It is almost impossible to define what we mean by *mind.* Mind has no physical or concrete existence, though it is certainly a product of the brain. All we know about mind are the *mental processes* that result from it, the thoughts, memories, emotions, instincts, attitudes, reactions, behaviour, etc. We do not know the mind itself.

If we compare the brain to, say, a piano hidden in another room, then the music that comes forth is like the mental processes, the gay music, the sad music, the high-pitched chords, the low tones. But the person playing the piano we cannot see and do not know. That is the mind. Is it some sort of penny-in-the-slot automaton, or is it something from a higher spiritual plane? This is the point where the mere hygienist hands over to the philosophers.

Some of the simpler mental processes are as follows:

1. Thought, or as we usually call it, *conscious* thought.

This is the way by which the mind expresses itself. Thoughts are continuous during our waking hours, and during much of our sleep too (dreams). During the day the thoughts are usually in the form of words (verbalized) e.g. "I think I will stop reading now", or "I wonder if the post has come yet?" At night the thoughts are usually in the form of images (visualized), though this can happen by day too when the imagination is working, or when we are "day-dreaming".

2. Memory

This is the storehouse of conscious or unconscious thought. There are various forms of memory: (*a*) Learned abilities and skills, e.g. the ability to write or ride a bicycle; (*b*) Recollections, memories of past incidents or lessons; (*c*) Behaviour patterns, i.e. the ways in which we have learned to respond or act in different circumstances.

3. Emotions

These are the feelings that come over us in certain circumstances. These feelings are intense enough usually to produce some change in our appearance, particularly the expression on our face. They are such things as: love, hate, pleasure, anger, happiness, fear, sense of beauty, disgust. The kind of circumstances that bring on these feelings, and the strength of the feelings brought on, are usually decided on during childhood.

The emotions may cause us to act in certain ways, e.g. anger may make us do foolish things, fear may make us run. Healthy-minded persons are, however, usually able to control these actions, or *impulses* as they are called.

The emotions are often "infectious", passing rapidly from one person to many others. This is especially true in children, who, for example, laugh when everybody else laughs, and cry when mother or father cries, even though they cannot possibly understand the reasons for it. Among adults it is well known how a happy person radiates happiness, and a frightened person radiates fear. Mobs can be moved to anger and violence if the emotional state of an agitator is sufficient to affect them.

The emotions are for the most part of two kinds: (1) the *pleasurable* emotions are those that make us feel more comfortable mentally; (2) the *painful* emotions are those that make us feel more uncomfortable, e.g.

Pleasurable	*Painful*
Love	Hate
Delight	Anger
Elation	Depression
Beauty (aesthetic feeling)	Disgust
Attraction	Fear
etc.	etc.

The painful emotions often upset some of the body systems; anger raises the blood pressure, fear makes the heart beat faster, disgust causes nausea, and so on.

4. Instincts, Drives, Motivations, and Wants

An instinct is a way of behaviour laid down in the brain by inheritance; it is not learned by any acquired experience. Instincts are very important to lower forms of life such as insects and birds, and to a lesser extent in mammals. In man the instincts are hardly recognizable. The baby duck swims by instinct; the baby human sucks by instinct. But so difficult is it to decide which forces are true inherited instincts, and which come on later, that it is better to use the term "drives" or "motives" instead, to avoid confusion.

Some of the drives probably possessed by man are:

(*a*) The drive to preserve one's life; to flee from danger, to fear death.

(*b*) Drives of physiology; to eat, to drink, to exercise, to keep warm.

(*c*) The drive to associate with the opposite sex; indirectly this implies a drive to reproduce.

(*d*) A drive to protect the young. This is especially strong in women (maternal instinct).

(*e*) The drive to seek the approval of the other people in the group to which one belongs.

(*f*) A constructive or creative drive; the urge to express oneself by making things or in art.

(*g*) The drive to explore; curiosity.

There is usually a conscious or unconscious feeling of compulsion associated with the urge to act according to our drives. Anything that helps us towards fulfilling these desires gives us pleasure, and we approve of it. On the other hand anything that directly or indirectly hinders our drives gives us an uncomfortable feeling of tension or "frustration". Situations helping drives may bring out pleasurable emotions in us. Situations hindering drives may bring out painful emotions.

The Group Approval drive (*Herd instinct*). This is undoubtedly the most important of the drives. Some psychologists would even say it is the only one.

A *group* is a collection of people to whom we feel we *belong*. It may be our family, our race, our nation, our social class, our schoolmates, our workmates. We may belong to several different groups at the same time for different purposes.

Almost all our behaviour is such as will be approved of by the particular group to which we feel we belong for that purpose. The group, we are sure, will look with strong disapproval on those who do not conform, and we ourselves take delight in acting with the group in casting out such people. This is the basis of much of the so-called race-prejudice against minority groups.

The group approval drive is probably an inherited relic of the old days when social solidarity was essential for the well-being of the tribe. So we find this drive especially strong in primitive tribes, and in children. Group approval gives a feeling of safety, comfort and pleasure.

Some individuals feel the urge to secure their position in the group either by (*a*) domineering over others—the *superiority* complex, or by (*b*) humility or self-effacement—the *inferiority* complex, as it is called. Among children we can sometimes see this; some are aggressive, some are submissive. All of us, quite normally, feel the desire to be either aggressive or submissive when faced with important social contacts. Healthy-minded persons steer evenly between the two.

In addition to the deep underlying drives mentioned above, that we are hardly aware of, there may be more superficial *wants*. We want to succeed in life, we want to form a new political party, we want to pass our exams, etc. The way we attempt to satisfy these wants will depend on our past experiences, especially those of childhood days. We shall tend to feel comfortable and relaxed in any situation which helps forward our wants, and tense or worried in any situation which hinders them.

If a drive or a want cannot be satisfied, we shall have to *adjust* ourselves to the fact. The healthy mind accepts the situation, and ceases to want what it cannot have. Less healthy minds make excuses, blame others, pity themselves, develop bodily infirmities, and may do many other things to avoid the pain of giving up their desires.

5. Temperament (Personality)

Temperament is the word used to describe the mental make-up, the mental behaviour, of the person in his daily life. It can be thought of as the "expression" of the mind. Just as some people have an expression on their face of cheerfulness, or haughtiness, so is the temperament cheerful or haughty. Not all types of temperament show on the face, however. Other temperaments are optimism, or pessimism; slowness to anger, or quick-temperedness; domineering, humble; calm, excitable; self-reliant, dependent; etc. Psychologists like to talk of two more types, extroverts and introverts. Extroverts are usually thinking of the effect of their actions on others; introverts are usually thinking of the effect of their actions on themselves; leaders and politicians are extroverts, poets and saints are introverts. Most healthy-minded people have a little of each in their temperament.

Temperament is also closely connected with the workings of the internal glands of the body. If a particular gland seems to be overworking, it may influence the temperament in a certain way; for example, gland action can make people excitable or lethargic, domineering or humble.

6. Attitudes

These are habitual ways of thought about certain things, such as work, religion, politics, race relationships, leisure, womankind, etc.

These attitudes are engraved on our minds when they are young and receptive, and so they are often fixed and permanent. Naturally they are the attitudes of the particular group which happens to be influencing us at the time, our family, our teachers, etc.

These attitudes are often strongly clung to throughout life, often against all reason. The healthy mind, on the other hand, attempts to form its own attitudes after it has reached maturity, and bases them on sound reasoning unhampered by prejudice ("prejudice" means judging without listening to evidence).

The healthy mind is willing to alter its attitudes if need be. Sometimes attitudes are not permanent and are unconsciously altered. Attitudes taken secondhand from persons in authority in the group, or associated with an emotional experience, are more fixed and rigid than those thought out for oneself.

7. The Idea of Self (the Ego, Self-regard)

We are not born with any idea of ourselves. We gradually get some ideas about ourselves from three sources:

(a) *The social self.* We know our social self only by the way others react to us. If people appear to be pleased with us, we think of ourselves as pleasant people; if people are displeased with us we think of ourselves as unpleasant people, and so on. Especially in childhood is the idea of this self developed, first at home and then at school. Gradually we come to realize what other people expect of us, and that is what we become, that is the part we play in the theatre of life. This shows how important it is not to "give a dog a bad name", especially a child. If a boy thinks he is regarded as "bad", he may eventually be "bad", permanently. Conversely, a girl who is thought of as "kindhearted" may actually develop kindheartedness as part of her character.

It is possible to have several different ideas of our social self, because different people expect different things of us. Thus we say that some people "bring out the best in us", whereas, in the presence of others we may not think so much of ourselves.

(b) *The material self.* This is the idea of ourselves we get from our bodies, our possessions, our achievements. We look upon ourselves as "rich", "poor", "strong", "weak", or whatever it is.

(c) *The spiritual self.* These are the kinds of feelings, emotional attitudes, ideals, sense of right and wrong, etc., which we gradually take on for ourselves.

The *idea of self* is an essential part of *character* and *personality*. Our idea of ourself will determine how we behave, and how we appear to others. We look upon this "self" as the real "me". We become fond of it, we cling to it, protect it, defend it, and live up to it, regardless of whether it is good or bad. It can thus be seen how important it is for children to be given a good impression of themselves, and a high sense of their own character. In the worst person there is a spark of self-regard which can often be strengthened, so that they can be encouraged to "live up to the best in themselves", not to "let themselves down", etc.

8. The Unconscious (the Id and Super-Ego)

A good deal of the work done by our minds goes on under the surface as it were, where we know nothing of what is happening.

It was the great psychologist, Freud, who first discovered the importance of this part of the mind. He divided it into two portions, the Id and the Super-ego.

The Id consists of those forces which are instinctive, or primitive, or which were learnt in the first few years, perhaps even the first few days, of life, the forces which seek only pleasure and self-gratification. The Id has no moral feelings, no consideration for others. It does not act on logic or reason, but purely the immediate gain.

The Super-ego, on the other hand, is what keeps the Id in control. It is an unconscious conscience. It works by suppressing the dangerous or anti-social tendencies of the Id. The Super-ego is often a severe judge of wrong, far more severe than our conscious Ego. This is because its standards, like the desires of Id, were formed very early in life, when in the child's mind there formed simple and definite ideas of what was permissible and what was not permissible. The Super-ego can be thought of as the echo of the stern parents' orders, long forgotten, but still influencing us. No harm is done unless the influence of the past is too strong and hinders our freedom of self expression. The workings of the Super-ego are sometimes consciously felt as a sense of guilt, especially about something that in adult life would not normally bother our consciousness.

Much mental ill-health is due to the quarrels between the naughty Id and the too strict Super-ego, influencing our ordinary adult lives. These mental illnesses are often due to circumstances which remind the sufferer of some long-forgotten conflict between these two, for example a conflict between loving and hating one of the parents. Such conflicts are normal in young children, but can cause all sorts of mental ill-health if continuing in adult life.

The workings of the Id and Super-ego are often laid bare during dreams.

9. Intelligence

Intelligence is something that is very difficult to define, but roughly speaking it is the capacity or ability of the brain to function efficiently. It is the capacity not only to acquire knowledge but also the ability to use knowledge.

Intelligence must not be confused with learning. There are plenty of intelligent people who have never been to school. Conversely there are people who are crammed with knowledge, but who cannot be said to be intelligent.

Intelligence is not the same as wisdom. Wisdom is found in a person with extra intelligence, who has profited well by experience and education. Intelligence can be best thought of as the "size" of the brain, size being written in inverted commas because we do not mean its actual weight or circumference. The possible "size" to which our brains will grow is something that each one of us is born with, in the same way that we are each born with the possibility of growing to a certain height. Brains of large "size", if trained and used properly, will be intelligent, brains of small "size", however well trained, however much learning is forced in, can never be intelligent.

Just as tall parents have tall children, and short parents have short children, so we find that, usually, intelligent parents have intelligent children and dull parents have dull children.

What does intelligence consist of? Here again it is difficult to say precisely, but psychologists make some such list as follows:

Ability to learn. The ability to sort out information, to store it logically in the mind, to reproduce it when necessary. The ability to acquire skill, to improve with practice. The ability to profit from experience.

Perception. Perceiving such things as differences in shape and colour; perceiving that circumstances have changed. The more intelligent person perceives more rapidly than the dull; he quickly perceives that his child is sick, or that it is going to rain. He is a good judge of people or things.

Memory. The memory of a sequence of events, the memory of the details, say, at the scene of an accident, the facility with which words or numbers can be learnt by heart.

Comprehending relationships. Understanding the relationships between parts and wholes, between causes and effects; attaching relative values to events; drawing conclusions; making generalizations from isolated facts, or deducing a probable event from a general principle; foreseeing the consequences of actions.

Imagination. The ability to project in one's mind the picture or image of the problem to be solved, or the emotion to be felt; for example, the engineer must be able to imagine the stresses and strains in the machine he is designing. The artist must be able to imagine what he is going to paint, the author must be able to imagine what his characters feel.

Ability to use numbers. The use of numbers, even in simple mathematics, requires a certain amount of intelligence. Unintelligent people cannot even add a few shillings and pence without writing the sum down.

The above are some of the component parts of intelligence. They could be rearranged differently and expanded a good deal. They are what can be called "general" intelligence—sometimes called simply "*g*".

Some people have special intelligence in certain directions—sometimes called "*s*". For example, they may be brilliant mathematicians or musicians, while their "*g*" is hardly out of the ordinary. Very rarely does anyone have a very high "*s*", however, unless he has at least an average "*g*". Usually persons "good" at one thing are "good" at most things.

Intelligence in Childhood: Mental Age. Since we can think of intelligence as related to the "size" of the brain, it follows that as a child grows so his intelligence grows. Tests have been devised to measure intelligence. The tests include problems of perception, memory, comprehension, etc. The tests are very simple for small children, getting progressively harder for older children. After testing many thousands of children, psychologists have discovered what are the normal expected standard tests to be passed at each year of age. This gives a scale of units by which intelligence is measured, each year of age being one unit. The score which a child obtains on this scale is called his "mental age". The average child of age, say, six years has a mental age of six, the average child of fourteen years has a mental age of fourteen. It was noticed that in most people the intelligence does not grow much after the age of fourteen years, so we find that average adults all have a mental age of fourteen.

The Intelligence Quotient (I.Q.). What about children or adults who have not got a mental age corresponding to their actual age? A system of measurement has been devised which gives an indication of the degree of intelligence at any age. It is simply the ratio: $\frac{\text{mental age}}{\text{actual age}} \times 100$.

This is called the *Intelligence Quotient* or *I.Q.* for short.

A child aged ten with a mental age of ten will have an I.Q. of 100 per cent., which is the normal.

A child aged ten with a mental age of seven has an I.Q. of 70 per cent, which means that he is mentally dull.

A child aged ten with a mental age of twelve has an I.Q. of 120 per cent, which means that he is bright.

For adults the actual age is always taken as fourteen. If an adult has a mental age of, say, sixteen then his I.Q. is $16/14 \times 100 = 121$ per cent. He is clearly a clever person.

It has been found that the I.Q. value remains fairly constant throughout childhood and adult life, unless there have been serious physical or psychological disturbances. Therefore, generally speaking, a dull child will be a dull adult and a bright child will be a bright adult, which is what we expect already. This ability to measure intelligence fairly accurately gives one an opportunity to plan the future careers of children with more usefulness.

It is found that the population at any particular age of childhood, or all adults, have I.Q.'s "distributed" according to the normal "probability" which we find in all statistical investigations (details of which we cannot go into here). We can accept the state of affairs to be roughly according to the following table.

0·1 per cent of people are helpless idiots or imbeciles with I.Q.'s below 50. These remain as helpless as children all their lives and need to be cared for in special homes.

5·9 per cent of people are "feeble-minded", or "mentally subnormal", with I.Q.'s between 50 and 75. These have to be educated in special schools or institutions, and are never able to look after themselves properly. They may commit foolish crimes, sometimes of a sexual nature.

14 per cent of people are "dull" with I.Q.'s between 75 and 90. Such children need special attention at school, and as adults are usually only able to earn their living as labourers.

60 per cent of people are "normal" or "average", with I.Q.'s between 90 and 110.

14 per cent of people are "bright" or "superior" with I.Q.'s between 110 and 125. These are persons who will profit from secondary (high) school education, and university education. They will make successful business or professional men, or, if uneducated, skilled craftsmen, hunters or leaders.

6 per cent of people are "very intelligent", with I.Q.'s above 125. They have the capacity to become brilliant workers, whether it is art, engineering, research work, politics, crime or anything else.

Practical Implications of the I.Q. From a *public health* point of view some sort of care and supervision should be provided for about six per cent of the population. They should not be allowed to marry because their children will also be feeble minded. In some countries such people are actually sterilized by operation, so that they cannot have children. If a man has sexual intercourse with a feeble-minded woman, with or without her consent, he is committing the crime of rape.

The dull people (14 per cent) are free to marry and unfortunately they often have large families of dull children because they are not intelligent enough to practise birth control.

From an *educational* point of view, the authorities must provide special schools for about 5 per cent of children, and give special attention in the ordinary schools to the 14 per cent of dull children.

Since only another 20 per cent can profit from secondary (high) school education, much time, money and effort could be saved by more careful selection of children destined for the universities.

Much mental suffering, psychological damage and even cruelty occurs when children of only "average" ability are driven up to matric. level and beyond. A more suitable "school-leaving certificate" should be devised for such pupils. Similarly parents' ambitions for their children's future careers should be brought within reasonable bounds. Some of the mental ill-health in adult life can be attributed to the frustration brought about in people who are trying to do jobs beyond their mental ability.

10. Aptitudes

Each of us is born with, or acquires during childhood, certain "talents", certain potential abilities. Thus some people may be good with mechanical things, others may be good at making things with their hands, as in pottery or sewing. Some may be good at rapid thinking, others may be content with monotonous repetitive occupations. Some may be leaders, original in thought, willing to take initiative and responsibility, while others will have to remain "hewers of wood and drawers of water".

Psychologists have devised tests for measuring aptitudes. These are of considerable importance and interest to teachers, and to industrial personnel managers, so that each man is fitted to a suitable job, and so that talent is not wasted nor simple people overtaxed with complicated work.

Causes and Prevention of Mental Ill-health

Undoubtedly the health of the mind is decided during babyhood and childhood. The brain of a new-born babe is like a clean slate, or, rather, like a new Babylonian clay tablet, soft so that every mark sinks in, engraved for the rest of its life. The baby models its behaviour and attitudes to life on these first impressions—it has nothing else to judge the world by. Later, the slate becomes so covered with marks and scratches that further impressions no longer have such an influence. We can thus see why events that appear quite trivial to the adult mind can have a lasting effect on the child's mind.

The child's first experience of the world is the fact that its desire to suck is gratified by the provision of milk. If there is plenty of milk flowing from a warm and comforting mother's breast, the child's first impressions are favourable. But the opposite can be the case.

Gradually the desire for the mother's milk is replaced by the desire for the mother's love, then the father's love, then the world's love. If the love is returned the child gains in confidence. If the love is withheld, or if for some reason the child doubts it, the child will fear or dread what life has in store, and will prepare to defend himself.

Among African babies mother-love is available in abundance. The breast is never refused, the baby is never left alone to cry. But, when weaning time comes, the break, the refusal of access to the breast, is all the more of a shock and may be more disturbing than in the case of babies who are weaned earlier in life and more gradually. Another source of disturbance to a child may be the arrival of a younger baby, who may appear to be replacing him in his mother's affections. Parents must take care to counteract this.

Allied to the desire for love is the desire for security, for certainty. If the child cannot feel confidence in his parents, if the growing mind has nothing firm to cling to, the seeds of neurosis are already being sown. Thus children brought up in a broken home, where one or both parents has left or died, are at a great disadvantage. Foster parents, or teachers of such children, must go to great pains to try to fill the gap in their lives. Children brought up in homes where the parents are quarrelling, or obviously do not love each other, or are obviously unhappy, are similarly in danger.

Children like to feel that life is consistent, that it runs according to a pattern. Just as primitive and uneducated people feel happy only when living according to "custom", so do children only feel at ease when life is running in the way that they are used to with no unexpected shocks, surprises or disappointments. Naturally such things cannot be entirely avoided, but parents should try to follow regular habits with their children, and should always try to respond in the same way whenever the same event occurs. They should stick to routine. It is damaging to the child's sense of security if he is petted one day and ignored the next, or if a certain behaviour results in punishment on one occasion, and is ignored the next time.

The importance of all this lies in remembering that the basic patterns of how an adult thinks, acts, behaves, what his emotional life is likely to be, the way he will act when faced with difficulties or disappointments, and many more patterns, are formed during childhood.

If the child has to face troubles, doubts and worries, all alone, with no one who can understand his troubles, no one to give him love and comfort, the world will seem a hard and forbidding place. His mind will form in a way that attempts to protect him from this hard world. He will be hard, difficult, unpleasant, restless. When he grows up, even if he learns to gloss over the real state of his mind, so that it appears normal, underneath will be these basic ways of reacting to difficulties, that will emerge at times of mental stress.

In most cases, fortunately, children are brought up in homes where there is at least love and mental comfort. In such homes, where the ways of reacting to life's difficulties are healthy and flexible, and where emotional tension is reduced to a minimum, the child's mind can grow and mature safely. Young children are like mirrors. They reflect the mental states of the people influencing them, particularly the mother and father. In homes where there is love, generosity, honesty, self-respect, etc., the child will take on these things. It is useless to try to *teach* the young child what to be; he will automatically absorb what surrounds him, whether it be good or evil.

At *school* children deserve to be influenced by teachers who have well-balanced minds, minds with healthy attitudes and free from intolerance. All teachers should, and must, take the trouble not only to understand the child's mind, but also their own. School is the child's first experience of the great big world outside his home. How he finds life at school will decide what his attitude to adult life will be. Is he going to withdraw into a protective shell, is he going to react by attack and aggression, or is he going to feel that everything is pleasant and normal and that he fits naturally into the scheme of things? (See page 202.)

At school each child's intelligence should be scientifically tested, so that he will not be forced beyond his capacity to learn, nor be trained for a career in which he will not be likely to succeed.

Long before puberty is reached each child should have an understanding of the physiology of human reproduction, so that he will be able to understand, and not be frightened by, the great changes which later occur in mind and body.

Puberty is always thought of as a time of great emotional upheaval. Certainly many children go through much mental trouble, doubt and uncertainty at this time. Sympathy, understanding and encouragement is needed to help them through. But it is probable that the basic pattern of personality has already been laid down, and little can be done to alter a child's fundamental attitudes to life by this stage.

Puberty is perhaps the great opportunity for *character* training. Young people entering the new world of the adults are full of high ideals, they want the world to be beautiful and want to help make it so. Wise teachers and parents will take the opportunity to develop this idealism, yet at the same time see that the ideals are kept within the bounds of the hard world of reality.

At this age the child can be *taught* what is required for good character: to face the world with courage and confidence; to behave towards others as he would wish them to behave towards himself; to be honest with himself, and to treat his mind (and body) with respect.

He should be taught to take responsibility, at first in small quantities gradually increased. At the same time he should still be able to feel at this stage that behind him is the security and love of his parents and the friendly encouragement of his teachers, pleased with his successes and not too severely critical of his failures.

Group activities such as Boy Scouts seem to fill a particularly useful need at this age. There is the comfort of being part of a group of similar companions, there is the opportunity for developing skills, there is the opportunity for "adventure", and break from parental ties. At the same time there is a definite social code to follow, and a code of sex behaviour which allows no room for doubt. The child, instead of floundering through puberty alone and unaided, does so in the company of others along well-trodden paths. It is possible that the initiation ceremonies in other cultures have a similarly useful function.

Adjustment to Adult Life

Every human being lives in a little world, a little group, whether it be at college, at home, in a factory or in the Army or anywhere else. It has already been stressed how important it is to fit in with the group, to adjust to the ways of life and ways of thought there, so that the "atmosphere", in the psychological sense, is the most comfortable and healthy for all concerned. A young person entering adult life has the difficult and important task of learning and practising such adjustment. The way he does so will become a part of his personality for the rest of his life. Adjustment can, however, be improved with practice, and mistakes made in one group can often be avoided in subsequent ones. Adjustment is something that each person has to do for himself; it is not something that can be done for him, but we can all try to help young adults, and newcomers to our group, by the right amount of sympathy and friendship.

Since adjustment is such a personal matter we can perhaps study it best by placing ourselves in the position of the person making the adjustments.

Firstly, we can classify the rest of human beings in the group on three different levels, and there are therefore at least three different types of adjustment to be made. There are (1) those equal in rank with us; (2) those in authority over us; and (3) those subordinate to us. There may also be other human contacts, affected by such things as social class, age, intellectual ability, nationality, race, but these are matters usually outside our immediate group, and our attitude will in most cases be the same as that of the group.

(1) *Adjustment to equals.* The most important task is to get along well with one's fellow men. These are the ones who really influence us for good or for evil.

The great thing is to remember that our fellow men are exactly like us, neither better nor worse. Like us, they all *want* to be nice, and friendly, and respected, and to fit into the group. If they fail, if they are unpleasant, it is merely a sign of their own mental ill-health and we should not "react" to it and let it upset our own mental state.

We should avoid being extroverts—boastful, over-friendly, conspicuous. We should also avoid being introverts—shy, uncommunicative, difficult to get to know. Rather we should try to be something in between, a "good mixer" yet content to be ignored, or ready to be a leader, when necessary.

In any group there are those we automatically like, and those we automatically dislike. Everybody else has ideas like this too. Often such feelings are mutual and returned. We cannot hope to be friendly with everybody—it is impossible.

(2) *Adjustment to those in authority*. We should not be unduly afraid of our superiors, nor regard them with awe and reverence, but remember that they are human beings like ourselves who have a job to do.

Many people do the job of supervising, the job of ordering other people about, very badly. They are often tactless, overcritical and unnecessarily severe. But the healthy-minded person, when working under such a supervisor, should not "react" to such a state of affairs. We should avoid resentment, sullenness, insubordination, or any state of affairs that will make matters worse. Rather we should remember that such bad supervisors are only betraying their own mental weaknesses, and that, in the interests of mental peace all round, we should overlook any slights or insults. As long as we do our job faithfully to the best of our ability we have nothing to fear, and, moreover, our minds remain peaceful and healthy.

(3) *Adjustment to one's subordinates*. If you should find yourself in a position where you have power over others, this is one of grave danger to your own mental health unless you are truly fit for the job. If you are a true leader, acknowledged and respected by the group over which you have been set in authority, you are lucky. More usually you find yourself placed in charge of a group and you have to make your adjustment afterwards.

In the paragraph on adjustment to authority we mentioned how we can easily resent the way we are ordered about. So, if you are in authority yourself, you must remember to give orders in the most tactful way so as to give as little offence as possible. You must follow the golden rule and give orders to others in the way that you would like to receive them yourself. This situation is one of the most vital and fundamental of human relations, and, wrongly handled, can do untold harm, not only to the individuals (both the giver and the receiver of orders) but also to the peace and security of the human society in which we have to live.

Space does not permit us to discuss this in full, but briefly, if you are in authority:

(*a*) Give clearly understood orders.

(*b*) Orders should be suited to the worker, and within his capacity to carry out.

(*c*) When a change is necessary, discuss this with the subordinate in advance.

(*d*) Listen to his point of view sympathetically, and show you respect it.

(*e*) Never give yourself airs or puff yourself up. Avoid all harshness or severity. Avoid sarcasm, abuse or nagging criticism.

(*f*) Work as hard as, or preferably harder than, your subordinates. Take no mean advantages of your position and no unjust privileges to which you are not entitled.

Leadership

A group usually automatically selects its own leaders, those whom it respects and whose advice it will listen to. Often the real leader is not the flamboyant extrovert, always pushing his way into everything, but the quieter, more "sober" member who does not have so much to say, but what he says is sense and is listened to. A true leader is willing to take responsibility, he is self-assured, he is sincere, honest with himself and with others, and at all times reliable and consistent. He does not mind doing menial tasks. He does not need rank or a badge of office to exercise authority.

Self-knowledge (Insight)

This is the capacity to judge oneself and to understand the workings of one's own mind. Some of the points that a healthy-minded person should try to understand and control are:

He should control his own "reactions" to other persons' behaviour towards him.

He thinks out his relationship with others, and tries to base it on naturalness and sincerity.

He does not try to build up a position among his fellow men that is difficult, or a strain, to maintain.

He does not attempt to escape his responsibilities or avoid the strain of human contacts.

Careers

A satisfactory career is important for mental health. A good career is one suited to our talents, that will challenge our abilities and make us feel we are *doing* something, contributing something to mankind. It is no good having ambitions ridiculously ahead of realities or abilities. Even small jobs are important as part of a large whole; the world could not carry on without some people to do these small jobs that in themselves may not seem very spectacular. It is important to feel that we *belong* to the organization for which we work, and to work loyally knowing that we are being fairly rewarded in proportion to the value of our work.

All workers need *security*, and wise employers will let the workers know that they are secure in their jobs as long as they do their share honestly.

Where workers can get no mental satisfaction from their work, they should endeavour to make up for this by having a satisfactory recreation or social activity outside their work. A creative hobby is valuable. Community service in some sort of activity which will make the community a happier place (not a more discontented place) is of great value in mental health, for example organizing a youth club.

Marriage

Satisfactory mental relationships between the partners are essential. Mental health can be strained if one of the partners is thoughtless or selfish or does not return the love of the other. It must be remembered that marriage is a *partnership* based on mutual trust, respect and love.

Spiritual Life

Above all for mental health is required a strong sense of spiritual values, of the true meaning of religion. Just as our bodies need to be continually fed with nourishing foods in order to keep healthy, so in the same way our minds need to draw strength from the eternal truths of the spiritual life. Without such help few of us would have the strength to walk upright before men, to love our neighbours, to suffer fools gladly, to eat of the unleavened bread of sincerity and truth. Those of us who have reached man's estate can no longer seek the comfort of our mother's knee, or the security of our father's arm, when doubts and disappointments come our way. In religion a spiritual Father fills this place in our lives; as the Bible says, "except ye become as little children ye can in no wise enter the Kingdom of Heaven".

Society and Mental Health

In the world. Mention has already been made of the tremendously important fact that if we all had really healthy minds the world would be a happier and more peaceful place. We have also mentioned the danger of emotionally unstable agitators who can sow seeds of discord. It is also not without significance that the World Health Organization has placed Mental Hygiene among one of the most important needs of the world today.

At school. Recognizing the tremendous importance of treating mental disorders during childhood, in order to prevent the child growing into an unbalanced adult, School Health Services in most countries in the world now include a psychological clinic among the facilities provided. Such clinics, called "Child Guidance Clinics", have the function of helping the teachers and parents—and the children—to understand and deal with behaviour problems and other psychological disturbances. On the staff of each such clinic is a doctor specializing in psychological medicine, and a psychologist social worker.

At home. Children from broken homes can be taken by the local authority away from their unloving parents and put into the care of loving foster parents who will give them the emotional security they need.

Treatment. For adult neurotics treatment by a medical psychologist (psychiatrist) is usually necessary, whose job it will be to uncover the cause of the trouble and help the patient to understand himself.

For the insane some sort of institutional life, either temporary or permanent, is often necessary. In order that a person may be forcibly detained, and deprived of his freedom, he must be "certified" by at least two doctors and a magistrate. The same thing applies to idiots and imbeciles who are unable to look after themselves.

PART II

SCHOOL HEALTH

Chapter Eight

THE SYSTEMATIC HEALTH SUPERVISION OF SCHOOL CHILDREN

Parent's or Teacher's Duty?

The child's parents or guardians are the persons legally responsible for seeing that the child is kept in good health, and if they fail to do so, they can be charged with the crime of negligence.

The teacher, theoretically, only needs to be sure that the pupils are fit to be in school. For example, he must be sure that they can see and hear properly, and are suffering from no disease which interferes with learning or which is a danger to others.

But experience has shown that every teacher must take a wider view than this, and must be genuinely interested in health for health's sake. He should feel it a duty to see that, as far as the resources of the school permit, all pupils leave school as fit and strong as possible.

Teachers are therefore taking over to some extent the duties and responsibilities of parents. Some parents may, with justification, resent this, but there is no doubt that in the large majority of cases, teachers are better equipped to understand and deal with such matters than are parents. There are many reasons for this:

1. Most parents, especially of elementary school children, are less intelligent, less well educated, and less experienced than teachers.

2. Teachers can often see slight departures from the normal more easily than parents, particularly if the defect comes on very gradually. Teachers have a whole class of normal children to use as comparison, so that the child that is abnormal is more conspicuous at school than at home.

3. Such things as poor eyesight and poor hearing are not noticed in the early stages unless tested for deliberately; and parents rarely do this.

4. Some disturbances, particularly psychological ones, are only seen at school.

5. By keeping a continuous record of growth, development and health over long periods of time, teachers can often detect departures from health that might not be noticed even by a doctor seeing the child once.

A School Health Service

The good things of life are only given to those healthy enough to receive them, and education is no exception. All teachers will remember that when they first applied for admission to their training college they had to produce a medical certificate to show that they were fit enough to make worth while all the attention that was about to be given to them.

The elementary education of children, however, is in a slightly different category. *All* children are entitled at least to basic education, regardless of their health, race, creed or anything else. The purpose of the health examination of children is to see that they are fit to work at the ordinary school and benefit thereby, and, if not, to arrange such attention as they need.

Ideally there should be a School Medical Service staffed by doctors and nurses, who visit each school in turn. In most African schools, however, at the present time, the Principal has to make such arrangements as he can with regard to the health of his pupils. If he can get help and advice from a doctor or nurse so much the better. Usually he will ask the doctor or nurse to see those children whom the teachers have found to be suffering in some way. Failing this, he will himself have to arrange for the disposal of the children with defects. He will have to decide whether to send them to a private doctor, to a clinic, to a hospital, to an optician, to a dentist, or, if medical help is far distant and expensive, whether to do the treatment himself.

Teachers may feel that they are not qualified to take on these tasks, but the following pages will show that there is nothing very difficult about it. Naturally no teacher would take over the job of a doctor, but it is certainly part of his duty to be able to recognize departures from health and to make intelligent arrangements for treatment where necessary.

The actual practical purpose of the School Health Service, conducted by teachers, is:

(1) To detect *handicaps* which might interfere with the educational process:

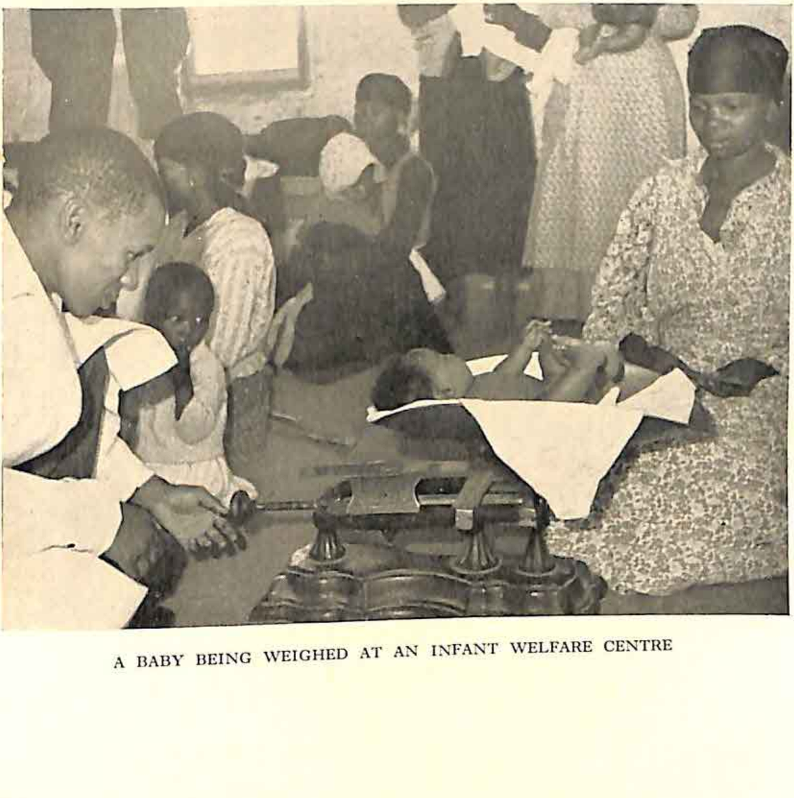
- Poor eyesight
- Poor hearing
- Psychological disturbance
- Mental deficiency
- General delicateness

(2) To detect *weaknesses* which should be put right in childhood, such as poor posture, mental defects, neurotic tendencies.

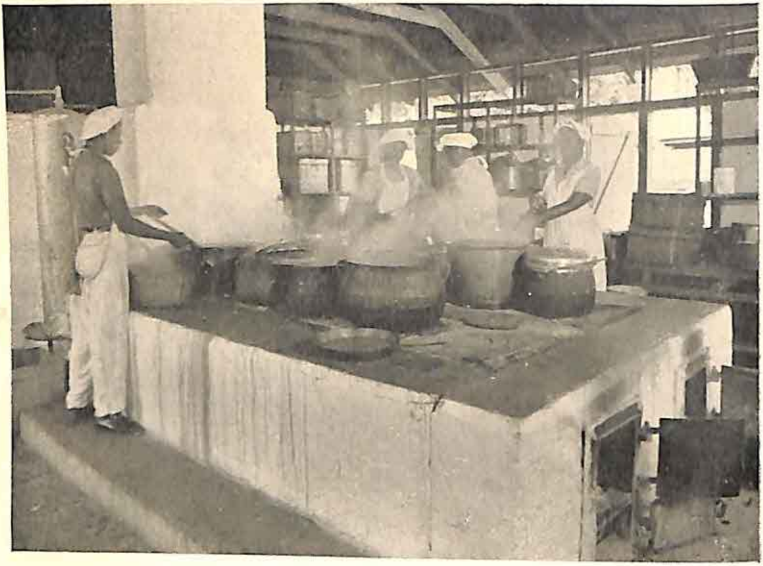
(3) To detect any *sickness* in the school children, so that the child can receive treatment, and, in the case of infectious diseases, to protect others.

- (*a*) Acute illnesses
- (*b*) Long-standing illnesses, such as:
  - Malnutrition
  - Chronic infectious disease (tuberculosis, malaria)
  - Anæmia
  - Parasites
- (*c*) Minor illnesses:
  - Septic sores
  - Scabies
  - Impetigo
  - Conjunctivitis
  - Wounds

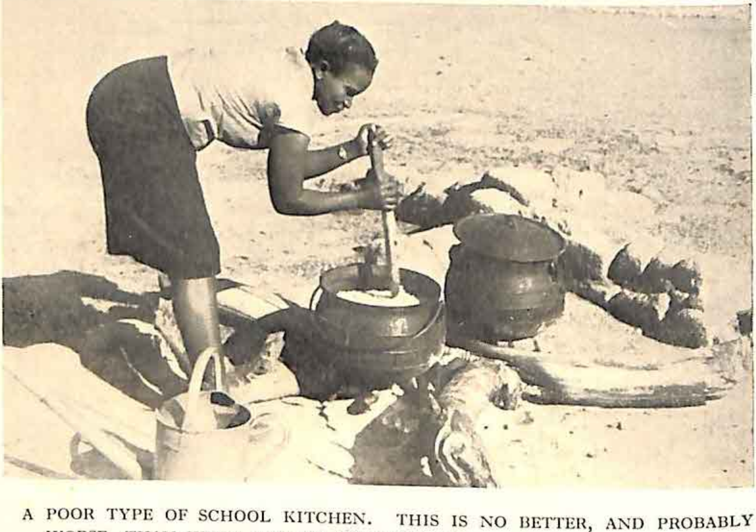
In order that no child and no conditions shall be overlooked, a systematic approach is essential. Medical inspection is not just something that is done when the teacher happens to think of it, or when the Principal orders it.



A BABY BEING WEIGHED AT AN INFANT WELFARE CENTRE



A SIMPLE SCHOOL KITCHEN FOR A LARGE SECONDARY SCHOOL



A POOR TYPE OF SCHOOL KITCHEN. THIS IS NO BETTER, AND PROBABLY WORSE, THAN WHAT CAN BE PROVIDED FOR THE CHILDREN AT HOME.

Medical inspection, or health supervision as we call it, has a definite place in the school programme. The health of each pupil should be as constantly the teacher's preoccupation as the pupil's progress with his lessons.

Health supervision is built up of three lines of approach.

1. The Daily Health Inspection.
2. Day-to-day Observation.
3. Periodic routine inspection.

1. The Daily Health Inspection

This usually takes place at the beginning of each school day. Its objects are:

(*a*) to detect those who are obviously ill;
(*b*) to check upon the pupils' cleanliness.

It is usual for the children to line up in front of the teacher. Only faces, hands and clothes are examined. The experienced teacher will recognize the child who is not feeling well. The child looks uncomfortable, and the face may look hot. There may be watery eyes, discharging ears. A few questions may bring out a complaint of headache or sore throat.

At such times the teacher will notice boils, sores or spots on the skin, or in the hair. The hair should be examined for nits and lice.

The teacher will also notice whether the children have been washed, and whether their clothes are reasonably clean; whether the child has an objectionable smell; whether the shoes are too small or badly worn out.

2. Day-to-day Observation

(a) The Healthy Child

In order to recognize departures from health it is necessary first for us to know what a normal child looks like. Health in general is easy to recognize. We say to a parent, "Your child looks well", but we ought also to try to define precisely what we mean by such a statement.

General appearance. A normal, healthy child is the picture of vitality, of life. He likes to be active, to be doing things, to be running about or playing purposefully. He does not easily get fatigued when running about with other children. His eyes are clear and bright, and his skin and hair dark and shiny. He has a cheerful and confident expression on his face.

Behaviour. He is active, enthusiastic, inventive. He may be mischievous, but in a harmless way. He gets on well with his playmates, and is not unduly shy with adults. If alone, he can amuse himself for a time.

He likes food and has a good appetite. His bowels open only once or twice a day, and he can hold his water for a reasonable time.

His attendance at school is good.

He is interested in his lessons, and absorbs knowledge readily.

If he has an obvious physical defect, such as a hump back, he compensates for it by extra cheerfulness, avoiding self-pity.

Posture. The normal child stands and moves with grace and beauty.

(b) The Sick Child

The fact that a child is suffering in some way may not be obvious, and it may be only after days or weeks that the teacher notices that some of his pupils are not appearing or behaving in quite the normal way. No two children are alike, but some are clearly outside the bounds of normality. It may be that they always seem tired, it may be the way they sit at their desk or the way they hold their books.

During physical education, especially if the children are wearing only shorts, the thin children, the awkward, deformed or limping children, and the weak or tired children will be detected.

Outside the set classes, the teacher should be noticing how each child behaves. The day-to-day observation is the only way to detect psychological maladjustment. Does he happily run and play with others, or does he appear solitary or weary? Does he refuse food? Is he always going to the lavatory? Is he coughing or breathless?

During day-to-day observation the teacher will be noticing whether children can see and hear properly. For example, teachers should notice if a child frequently copies incorrectly from the blackboard, as this may mean poor eyesight. If he fails to answer a question sensibly, it may be due to poor hearing.

Special notice should be taken of those who have to walk a long way to school, those whose fathers are away from home, those who are known to be poor, illegitimate or orphaned.

In post-primary schools, where there are subject teachers and no special class teachers, every teacher must be on the look-out for signs of ill-health, and report them, if urgent, to the Principal, or if not urgent, for discussion at the next staff meeting.

The Principal should, in such schools, appoint a definite teacher to be responsible for the daily inspection of the class.

Signs of Ill-health

Just as it is easy to see when a child is well, it is equally easy to see when a child is obviously sick. But the minor departures from normality have to be more carefully and systematically looked for.

There are three main channels by which information about the child's health should be sought by the teacher. Firstly, there is what the teacher can see for himself as he looks at the child, the signs or blemishes of disease; secondly there is the way the child behaves; and thirdly there is what the child may tell the teacher, his complaints.

For *treatment*, see page 226.

(i) General Appearance. If a child looks *thin* there is generally some underlying disease. The child that is too *fat* is also not normal, especially if he is pale and "flabby".

The *colour* of the skin is a good indication. It should not be pale or mud coloured: there should be a visible suggestion of warm red blood beneath.

The sick child does not look happy. He often looks *tired*, and is reluctant to join in the games of others.

(ii) Signs of Disease in Various Parts of the Body

Skin. A *dry skin*, which easily wrinkles, or where the pores are easily visible ("goose flesh") even when warm, is a sign of *malnutrition*, especially if the skin feels thin like chicken skin.

Spots on the skin are easily seen, and indicate various types of disease:

(1) Single small hard and tender lumps, later discharging pus: these may be *boils*.

(2) Small sores about the size of a small button, discharging pus or crusted over: this may be *impetigo*, especially if on the face. In other places it may be due to scratching, allowing germs to get into the skin—these are called *septic sores*. (Treatment, page 226.)

(3) Large foul-looking sores on the legs: probably *tropical ulcers*. (Treatment, page 227.)

(4) Large ulcerous painless growths on the skin may be due to *yaws*.

(5) Sores around the anus, private parts and lips: may be contagious or congenital *syphilis*. There may be other spots on the skin in this disease.

(6) Small very itchy spots, especially on the wrists and abdomen, never on the face: probably *scabies*, the bites and burrows of the itch mite. (Treatment, page 226.)

(7) Large patches of rough skin about the size of a penny or more, often in the hair: probably *ringworm*, a fungus disease, highly infectious. (Treatment, page 226.)

(8) Lumps or nodules under the skin may be due to parasitic *filaria* worms.

(9) Other itchy spots may be due to flea, mosquito or louse *bites*. Some forms of food indigestion cause itchy spots, e.g. *nettle rash* (*urticaria*).

(10) Some infectious *fevers* give spots on the body—see para. (iv) later.

Eyes. *Red watery eyes.* When this occurs alone it means that the eye is inflamed, i.e. *conjunctivitis.* (Treatment, page 226.) If there is fever and weakness, it may be part of an *infectious disease* of the whole body.

Red eyes, with the sclera replaced by red flesh, and thick sometimes inturned lids may be *trachoma*, a serious infectious disease of the eyes which may cause blindness.

Damaged cornea, especially white spots. This may lead to blindness if not treated. It is not infectious.

Swollen crusty eyelids. Inflammation of the lids, called *blepharitis.* Not infectious. (Treatment, page 227.)

The sclera thick and dark yellow or brown. The cornea may be dull. These may be signs of *malnutrition.*

The sclera greenish yellow. This is a sign of bile in the blood, i.e. *jaundice*, due to diseases chiefly affecting the liver, e.g. yellow fever. A doctor should be consulted.

The child may rub his eyes frequently, holding the book too close, blinking frequently. These may be signs of *poor eyesight.* (For tests of eyesight, see page 209.)

Ears. Sharp continuous *pain* in the ear, keeping child awake at night. This is a sign of *acute inflammation of the internal ear.* Send to doctor. See also page 227.

Discharge of *pus* from the ear. This is a sign of *burst ear drum.* (Treatment, page 227.)

The child is inattentive, does not answer questions, turns his good ear to the speaker. These are indications that the child might be *deaf.* (For tests for deafness see page 212.)

Nose. Running with slime (mucus) indicates the *common cold* or *hay fever.*

Running with *pus*, or slight *blood* may indicate *sinusitis* or other infections, or some *object*, such as a bead, up the nose.

Nose bleeding unless very frequently occurring, or accompanying fever, is of no account.

There may be difficulty in breathing through the nose, so that the mouth is kept open—possibly due to swollen *adenoids.*

Throat. Tonsils enlarged and means red, *tonsillitis*, i.e. sore throat. (Treatment, page 228.)

Tonsils with pus on them, *septic sore throat*, or *diphtheria*.

Coughing usually indicates that a common cold, or sore throat, has worked back towards the windpipe. This is called *tracheitis*. If the infection goes deeper it becomes *bronchitis*, which usually means the child is much more sick. He may be feverish. If there is difficulty in breathing, with weakness, *pneumonia* may be suspected. Attacks of difficult breathing without fever or weakness, are probably due to *asthma*. (Treatment, page 227.)

A cough continuing for months, with much spitting, sometimes blood, especially if the child is getting thin, may mean *tuberculosis* of the chest.

Teeth. *Decayed teeth.* Note if the cavity is small enough to be filled by a dentist.

Overcrowded or projecting teeth.

Swollen gums, bleeding easily, may be a sign of malnutrition.

Neck. *Swollen glands*, especially if the child is thin, may be tuberculosis.

(iii) Signs of Acute Illness

Some of the following may be observed by the teacher. They are an indication that something is seriously wrong, especially if they come on suddenly in a previously normal child, and especially if accompanied by fever.

Reluctance to move (listlessness)
Restlessness
Weakness
No appetite, nausea
Vomiting, frequent bowel motions
Headache, giddiness
Aching limbs and joints
Severe pain in any part of the body
Feverishness (the child feels hot to the touch, but complains of feeling cold. Take the temperature. It will usually be 100° F. or more)

(iv) Signs of Some of the Commoner Infectious Fevers

In almost all cases the fever is present for several days before the typical signs of the disease appear. The child feels hot to the touch (but says he feels cold or shivery). The pulse is rapid, 120 or more per minute.

The eyes are often watery, the nose may run. He may appear to have a cold. There is often headache, pains in the limbs and constipation.

Typical signs	*Name of Disease*
1. Headache and painful limbs	Influenza
2. Large red tonsils, with pus on them	Tonsillitis, or septic sore throat
3. White patches on tonsils, sometimes bloodstained pus in the nose	Diphtheria
4. Lump over the angle of the jaw	Mumps
5. Bursts of hard coughing, with crowing noise as breath is drawn in. Sometimes vomiting	Whooping cough
6. Red spots, pin-head size, or patchy, especially on chest	Measles
7. Small watery spots, size of this o, mostly on chest and back	Chicken pox
8. Large watery spots, size of this O, especially on arms and legs. Child very ill	Smallpox
9. Severe headache, dullness, bowel pains	Typhus, typhoid
10. Diarrhoea, with slime and/or blood	Dysentery
11. Recurring attacks of fever every few days	Malaria
12. Yellow eyes	Yellow fever

(See also page 233.)

(v) Some Other Signs of Disease

Fainting. The child falls quietly to the ground and lies still. He feels cold to the touch.

This usually occurs in overcrowded poorly ventilated rooms, especially to boys and girls at puberty. If it occurs at other times it may be a sign of illness (see page 228).

Convulsions. The child begins to jerk all over. He cannot control himself. He falls to the ground, he may foam at the mouth, and may dirty himself. Attacks are repeated every few weeks or months. This disease is called *epilepsy* (see page 228).

Weakness, thinness, paleness, coming on gradually may be due to *tuberculosis*, *hook-worm*, *malaria*, or other causes.

Headache is a common source of suffering. It often accompanies the acute illnesses. It may also be due to poor eyesight, to worry, or mental overstrain (see page 228).

Diarrhoea is due to inflammation of the bowel. It may be due to dirty food, food infected with germs ("food poisoning"), excessive use of purgatives, excessive eating of unripe fruit, or to actual chemical poisoning. If blood and slime are present, it may be due to *dysentery* (see page 229).

"*Stomach ache*." This is a common complaint, and is a term used for several different conditions: (1) *nausea* (the desire to vomit) which may be due to bad or unsuitable food, or to certain other illnesses; (2) true stomach (gastric) *pain* due to spasm or other damage. It occurs in acute poisoning, in cases of gastric-ulcer, and in severe hunger; (3) "*acid stomach*." This is a sensation of burning in the stomach, heart or throat. This is true indigestion, due especially to hurried eating; (4) *flatulence*. This is an excess of gas in the stomach or bowels; (5) *constipation*. Failure of the bowels to move often enough. Usually due to excess of starch and lack of fruit and vegetables. There may be vague pains in the lower abdomen; (6) severe sharp pain in the bowels, if repeated or continued, especially if accompanied by vomiting, constipation, or diarrhoea, may be a serious disease such as *appendicitis*.

Frequent or painful urination may be due to inflammation of the bladder or urethra.

Blood in the urine is usually due to an infection by the *bilharzia worm*.

Pus or sores round the private parts may be due to venereal disease. In children these diseases are often caught from dirty lavatories, or by sharing underclothes.

(vi) Signs of Poor Posture

The stance may be out of line. There may be a "hang-dog" look about the head, shoulders and arms.

There may be a sharp, unnatural curve forward (kyphosis), or backwards (lordosis), or sideways (scoliosis). The spine may be stiff.

A sharp bend in the spine is usually due to *tuberculosis*, but other bends are usually due to excessive weight carrying, or bad sitting and standing habits.

Knees may be knocking together so that there is a space between the ankles; or the legs may be bowed apart. This is often due to *rickets*.

Ankles may be fallen inwards, and the arches of the foot may be collapsed, so that the child has difficulty in standing on his toes, i.e. *flat feet*.

There may be weakness in one or more limbs, possibly due to old or present *paralysis* (e.g. polio).

Joints may be stiff or painful due to old or present rheumatism, or other forms of inflammation.

Persons with poor posture are liable to get chest troubles and spinal troubles. As adults, they are incapable of hard physical work. Poor posture often goes together with poor personality and poor character. (See also pages 122 and 206.)

(vii) Signs of Malnutrition

This is such a common condition in Africa that it deserves a section to itself.

Mention has already been made of the thin dry *skin*. No soft fat will be felt under it.

The *hair* may be dry and pale, sometimes reddish in colour.

The *eyes* often show signs of damage, especially the sclera, with redness and thick yellow patches (xerophthalmia).

The *lips* may have vertical cracks (cheilosis) or sores at the angles (angular stomatitis).

The child is usually *thin*, but may also be swollen in various places, particularly the face and abdomen, so that he appears to be fat.

The child is usually abnormally *quiet* and tired, lacking energy and refusing to play vigorously.

He has difficulty in concentrating on his lessons, and may be thought to be dull or *lazy*.

Diarrhoea is often present. This shows that the lining of the bowel is as unhealthy as the skin.

In *scurvy*, due to lack of fruit (Vitamin C) the signs are chiefly in the mouth. In *pellagra*, due to lack of Vitamin B, the signs are chiefly in the skin, particularly the backs of hands, fronts of shins, and cheeks.

(viii) Signs of Psychological Disturbance (Maladjustment)

Mental ill-health may show itself in a variety of ways. The inexperienced teacher may be too ready to label children "stubborn", "lazy", "bad tempered", "spineless", or other epithets, when really the child's mind needs to be very gently handled and restored to health.

The observant teacher will be suspicious if he observes any of the following, especially if combined with poor progress in school work:

Solitariness, excessive quietness.
Timidity, cries easily, excessive shyness.
Lying, defiance.
Aggressiveness, quarrelsomeness, destructiveness.
Day-dreaming, inattention.
Poor sportsmanship, inability to play with others in team games.
Restlessness, twitchings.
Persistent cheating, criminality.

Psychological upsets often affect bodily functions, so that the maladjusted child may also suffer from:

Sleeplessness.
Loss of appetite.

Frequent bowel or bladder motions.
Tiredness.
(See page 231.)

(ix) Signs of Lack of Intelligence (Mental Deficiency)

These children are also apt to be judged wrongly, and accused of laziness or evil ways.

Many children appear dull or mentally deficient, but the true cause may be due to bodily illness or psychological disturbance. Only when all other possibilities have been excluded should lack of intelligence be suspected.

Children who act in ways younger than their age, who like to play with young children, who fail to respond to instruction, may be suffering from mental deficiency. Such children are often dirty in their habits. They are sometimes short-tempered, violent, even cruel. They sometimes do not distinguish right from wrong.

This condition can only be diagnosed for certain, however, by an intelligence test. Such tests should only be performed by a properly qualified psychologist, or the school doctor (see also page 232).

This concludes the list of some of the things that an observant teacher will notice in his day-to-day observation of the children, and which will tell him that something is wrong. Other defects, particularly poor eyesight, poor hearing, and failure to grow, must be deliberately tested for in a routine systematic way, as follows:

3. Routine Periodic Inspection

At certain definite intervals each child is carefully examined by his teacher, with the object of detecting abnormalities which might not otherwise be noticed. The process may be likened to screening or sifting. The normal children pass through the mesh, while those with defects are held back, sifted off, so that they can be dealt with.

Where there is no school medical service this process is all the more important. The pupils discovered at this time, together with those noticed in the day-to-day observation, can be sent to such medical help as is available. In an organized school medical service, the initial sifting is done by the nurse.

The items usually included in the routine periodic inspections are:

(*a*) Growth
(*b*) Posture
(*c*) Teeth
(*d*) Eyesight
(*e*) Hearing
(*f*) Nutrition
(*g*) Other signs of ill-health

The inspection is most conveniently held a few weeks after the beginning of each session, i.e. twice a year.

One class is done at a time. If there is no spare room available, the classroom is used, but arrangements should be made to keep the class occupied elsewhere while the inspection is in progress.

The actual inspection should be done by the Principal or the Physical Education teacher. It may be possible to call on the assistance of the district nurse if one is available. Other teachers can assist. The class teacher is always present and keeps the records. The clerical work can, however, be done by a senior pupil.

Boys are inspected separately from girls. Only about half-a-dozen children should be in the room at any one time. A prefect or senior pupil may be used to call to the inspection those whose names are next on the list.

Boys should be wearing gym shorts only, and girls gym shorts and vest. Girls should be examined only by women teachers.

(a) Growth. Children are always very interested in their growth, and the process of growth is a practical demonstration of health. A chart of their growth, compiled from previous records, can be made.

(i) *Height.* On a smooth wall, inside the school building, a ruler should be drawn, from less than the height of the smallest child to higher than the height of the tallest. The ruler should be marked in inches, half inches, and quarter inches. The pupils could draw this for themselves. This ruler can be permanent and used every session.

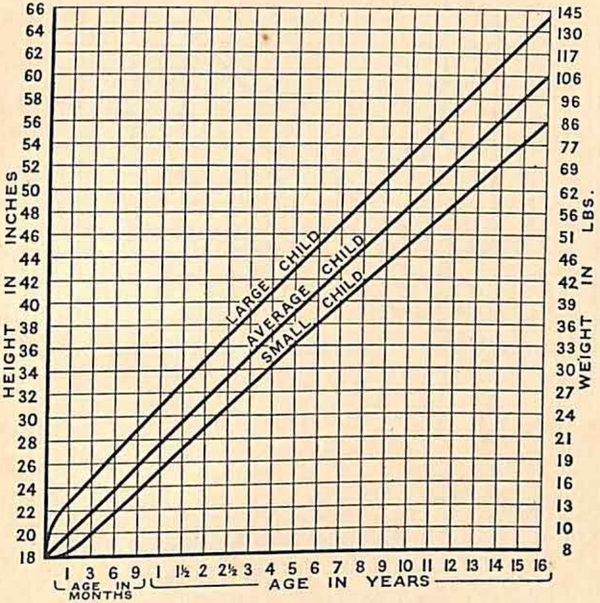


FIG. 23. NORMAL GROWTH CHART

Within these limits the child should grow at a rate parallel to these lines

The child whose height is to be measured stands without shoes with his back to the wall so that his head touches against the ruler. A chalk-box or a book held upright is then placed against the upper part of the drawn ruler and lowered until it just touches the top of the head. The level on the ruler is read off.

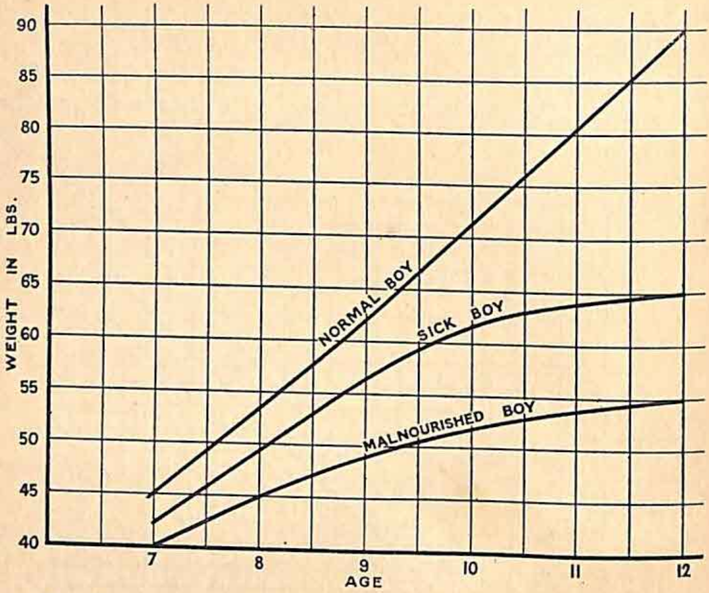


FIG. 24. A CHART SHOWING HOW RECORDS OF GROWTH RATES MAY REVEAL DISEASE

(ii) *Weight.* A weighing machine is unfortunately an expensive piece of apparatus and not all schools can afford one. Sometimes a friendly storekeeper can be persuaded to allow the class to come to his store and be weighed on his produce scales, or the same can sometimes be done at a railway or bus station.

If the school owns its own scales they should be checked from time to time at a store. The ones with a spring inside are especially liable to go wrong.

(b) Posture. Poor posture may already have been noticed in class or on the playing field. To examine the posture, ask the child to stand with his feet slightly apart, arms straight down. He should be viewed from the back and side.

In a normal child the following will be seen:

The head is held erect, balancing naturally on the spine. The eyes look out on a level plane.

The neck is straight.

The spine should show only the natural curves forward in the upper part, and backward below. There should be no exaggerated or sharp curves forward or backward, and no curves to the sides. The spine is supple and bends naturally without stiffness.

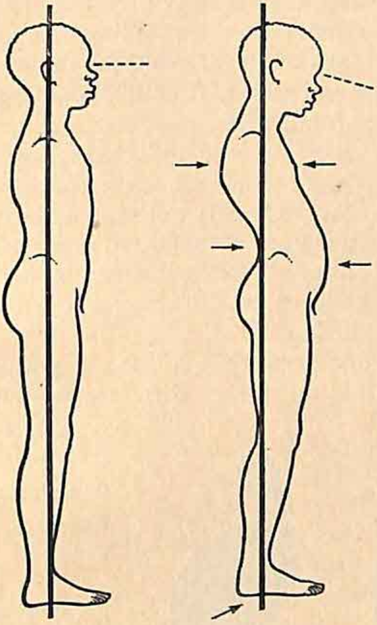


FIG. 25. SIGNS TO LOOK FOR TO DETECT POOR POSTURE

The shoulders are level, not one higher than the other. The shoulder-blades lie flat, not sticking out behind. The shoulder-joints face the side, not turning to the front. The arms do not hang forward.

The hips are level.

The arms are of equal length and thickness.

The legs are of equal length and thickness.

The knees just touch each other, without knocking, and without a wide gap between. The bones of the lower leg are almost straight.

The ankles and feet. The ankles support the legs without turning to the side. The arches of the feet are present.

The stance. When a child is standing in a good posture a straight vertical line can be drawn through the ear, shoulder, wrist, hip, knee and ankle. A child should be able to hold such a posture without fatigue or strain.

To measure *chest expansion*, place a tape-measure round the chest above the nipples. Ask the child to blow all the air out of his chest. Quickly note the figure, then get him to breathe in as deeply as possible and note the measurement again. The difference between the two figures is the expansion. School children usually have a chest expansion of about 1½ to 2½ inches.

If flat feet are suspected, moisten the sole of the foot with diluted ink on a rag, then get the child to stand on a large clean sheet of paper. The imprint will show whether the feet are collapsed or not.

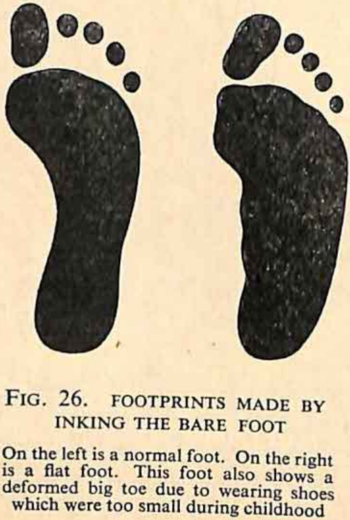


FIG. 26. FOOTPRINTS MADE BY INKING THE BARE FOOT

On the left is a normal foot. On the right is a flat foot. This foot also shows a deformed big toe due to wearing shoes which were too small during childhood

(c) Teeth. The child is asked to open his mouth wide so that the inner biting surfaces can be seen. Mark on the record card if teeth appear to be in need of dental attention, e.g. the teeth to be repaired, to be extracted, or if too overcrowded.

The gums and lips should be examined at the same time.

The experienced teacher may also be able to see whether the tonsils are enlarged or septic.

(d) Eyesight

(i) *Distant Vision.* In order to test distant vision, a special chart is used. This has on it rows of letters of various sizes from large to small. At the side of each row is a figure which indicates the distance away at which a normal person could read that line. The smallest letters are the 6 metre ones.[1]

The chart should be pinned to a board or wall where daylight falls on it (e.g. on the blackboard, which should be in this position anyway). A mark is made on the floor 6 metres (20 feet) away from it.

Children waiting to be tested should sit in another room, so that they do not get an opportunity to learn the letters by heart.

The child being tested stands behind the mark. He is given a piece of paper or card to hold in front of one eye. Both eyes are kept open.

The teacher then points at the letters with a stick, starting at the top with the big letters and working down. (He need not point at *all* the letters. A few in each line is enough.) The child calls out the name of the letter indicated.

Normal people naturally can read the 6 metre line at 6 metres. The score for that eye is thus recorded 6 at 6, or simply 6/6. If he can only read the 7·5 metre line, his score is 6/7·5. Each eye is tested separately.

The score for each eye is recorded thus: R. 6/6, L. 6/10 (or whatever it is). The right eye is written first (on the left of the paper), as the eyes are seen in life.

(ii) *Near Vision.* It is rarer to find children who cannot see things that are close up, but if this is suspected, test the child on small print such as is found in some Bibles. Cover each eye as before. The book is held at arm's length, and must be in a good light. (See page 233.)

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[1] Eyesight charts, as in the illustration, are obtainable from the South African Health Society, Lovedale, C.P., South Africa.

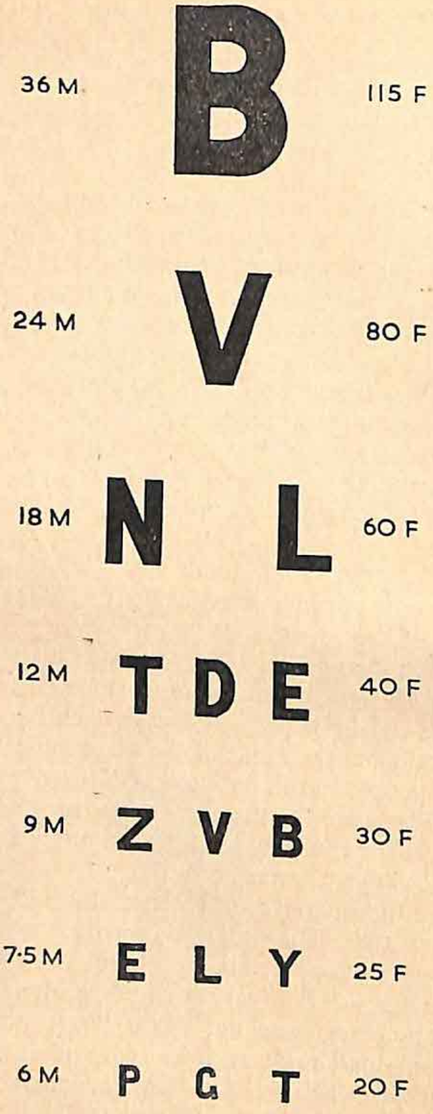

FIG. 27. LITERATE

FIGS. 27 AND 28. TYPES OF EYESIGHT TESTING CHARTS

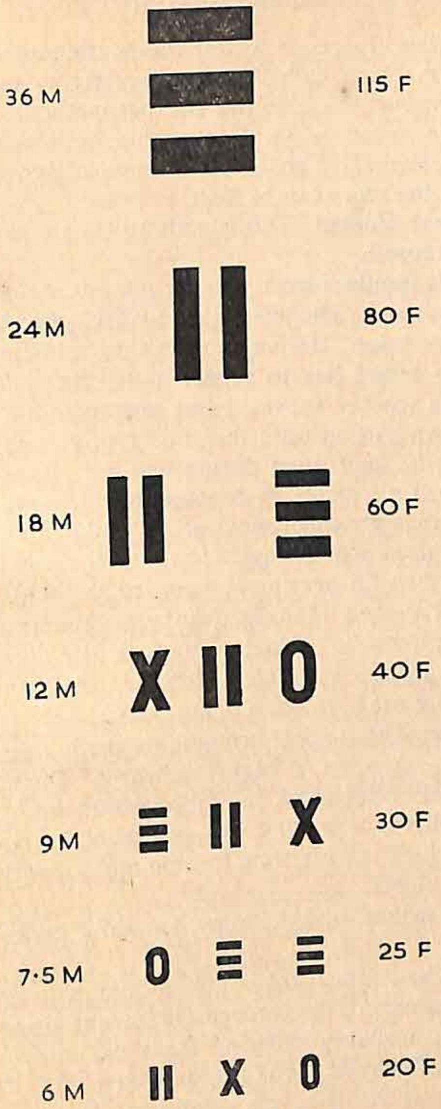

FIG. 28. ILLITERATE

Based on the "Fort Hare" eyesight testing charts, published by the Bureau of Hygiene, Fort Hare, C.P., S. Africa

(e) Hearing. In order to test the hearing accurately, an expensive machine called an audiometer is used. Most schools, however, have to use cheaper methods.

There are various ways of doing this, but teachers should stick to one method so that a numerical record of each child's hearing score can be kept.

The Speech Method. This is perhaps the simplest way but not very accurate.

The child stands sideways to the teacher, covering his far ear with his hand. The teacher stands 20 feet away and uses his ordinary voice. He reads out a short sentence, and the child being tested has to repeat it. If the child makes a mistake the teacher moves 3 feet nearer and says another sentence. And so on until the child repeats perfectly. The room must be kept quiet during this test. The number of feet distant is his score. A denominator or normal is taken as the distance at which most of the children hear plainly. If most children hear at say 20 feet, and the deaf child hears at 14 feet, then his hearing is recorded as 14/20.

The clock method. The disadvantage of the speech method is that next time the teacher may speak at a different pitch, or there may be a different teacher. A more accurate method therefore is to use a ticking clock, kept specially for the purpose. The clock is brought gradually nearer and the child has to say when he begins to hear it. The child stands with his back to the clock so that he cannot see it. In order to check whether the child can or cannot hear at any one point, the clock is from time to time muffled with a coat or some such object.

A watch with a loud tick may be used if preferred.

(f) Nutrition. When the child's mouth, skin and posture are being examined, the teacher will have to decide whether the child is probably suffering from malnutrition or not. The signs have already been listed on page 201. The teacher should look at the eyes, gums and lips. He should feel the texture of the skin. This combined with his knowledge of the child's behaviour and his growth record may enable the experienced teacher to come to some conclusion. Nutrition may be roughly classified as "good", "doubtful", or "bad".

(g) Other Signs of Ill-health

The neck should be examined for the presence of enlarged glands.

The skin is examined for the presence of sores, spots, wounds.

The throat can usually be seen when looking at the teeth. The presence of enlarged tonsils, especially if inflamed or septic, should be noted.

The nose. The teacher should make sure that the child can breathe through each nostril.

The Keeping of Records

Unless complete and accurate records are kept of the results of health supervision, much of their value is lost. It is important to trace the child's health from year to year, noting whether any defects found have been treated and whether there is any improvement.

Each child should have a separate Health Record Card. These are filed in order, and normally kept by the Principal. They are to be regarded as confidential documents.

The card should include the following information:

Information about parents
Previous illnesses
Vaccination and immunization state
Defects found, action recommended, action taken
Continuous record of height and weight
Eye and ear test scores
Nutritional state

A type of card satisfactory for this purpose is shown in Figures 29 and 30.[1]

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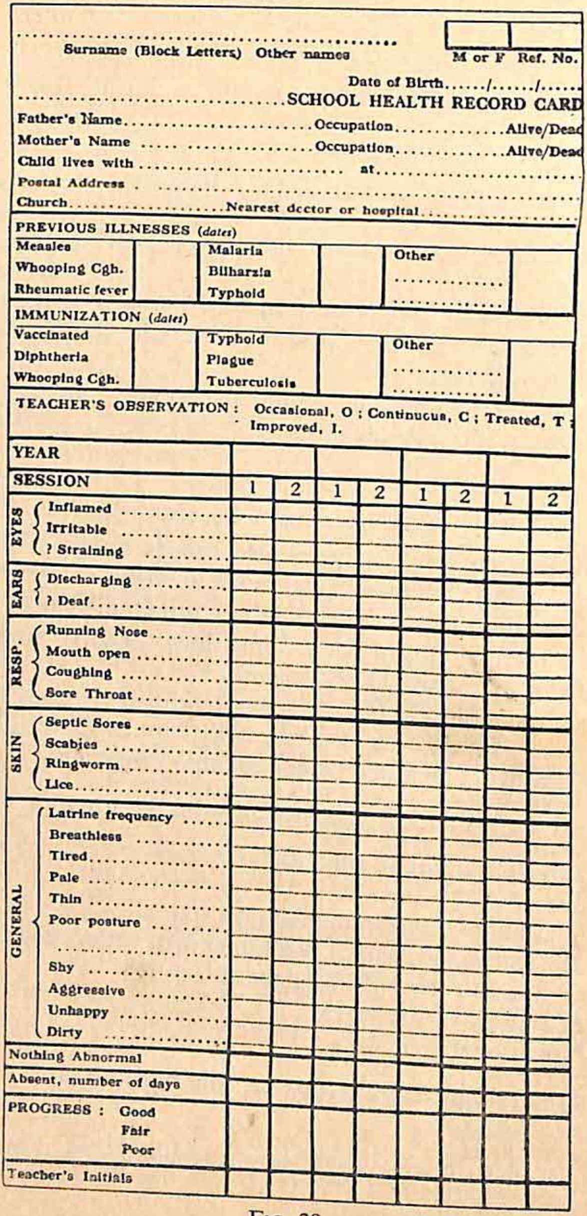
[1] Obtainable from the South African Health Society, Lovedale, C.P., South Africa.



....
Surname (Block Letters) Other names

M or F	Ref. No.

Date of Birth....../....../......

.... SCHOOL HEALTH RECORD CARD

Father's Name...................... Occupation.............. Alive/Dead
Mother's Name .... Occupation.............. Alive/Dead
Child lives with .... at........................
Postal Address . ...
Church.................... Nearest doctor or hospital......................

PREVIOUS ILLNESSES *(dates)*

Measles Whooping Cgh. Rheumatic fever		Malaria Bilharzia Typhoid		Other	

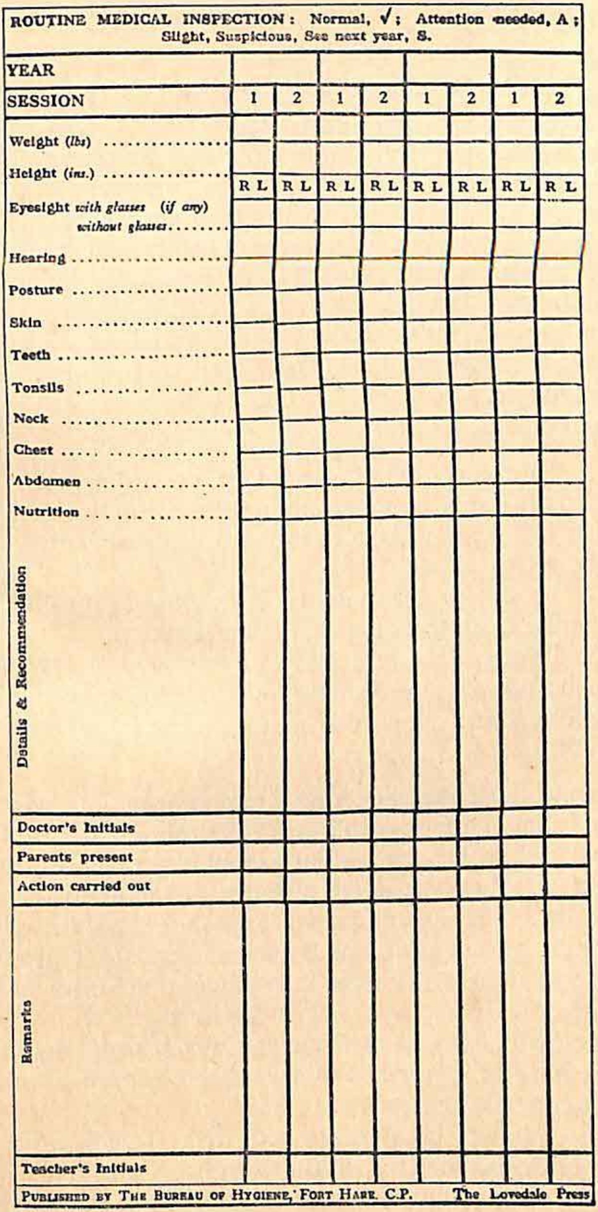
IMMUNIZATION *(dates)*

Vaccinated Diphtheria Whooping Cgh.		Typhoid Plague Tuberculosis		Other	

TEACHER'S OBSERVATION : Occasional, O ; Continuous, C ; Treated, T ; Improved, I.

YEAR									
SESSION		1	2	1	2	1	2	1	2
EYES	Inflamed								
	Irritable								
	? Straining								
EARS	Discharging								
	? Deaf..................								
RESP.	Running Nose								
	Mouth open								
	Coughing								
	Sore Throat								
SKIN	Septic Sores								
	Scabies								
	Ringworm..............								
	Lice........................								
GENERAL	Latrine frequency								
	Breathless								
	Tired..................								
	Pale								
	Thin								
	Poor posture								
	....								
	Shy								
	Aggressive								
	Unhappy								
	Dirty								
Nothing Abnormal									
Absent, number of days									
PROGRESS :	Good Fair Poor								
Teacher's Initials									

FIG. 29



ROUTINE MEDICAL INSPECTION: Normal, √; Attention needed, A; Slight, Suspicious, See next year, S.

YEAR								
SESSION	1	2	1	2	1	2	1	2
Weight (*lbs*)								
Height (*ins.*)								
	R L	R L	R L	R L	R L	R L	R L	R L
Eyesight *with glasses* (*if any*)								
without glasses........								
Hearing								
Posture								
Skin								
Teeth								
Tonsils								
Neck								
Chest								
Abdomen								
Nutrition								
Details & Recommendation								
Doctor's Initials								
Parents present								
Action carried out								
Remarks								
Teacher's Initials								

PUBLISHED BY THE BUREAU OF HYGIENE, FORT HARE. C.P. The Lovedale Press

FIG. 30

An Organized School Medical Service

Where there is a School Medical Service, it is usually one of the sub-departments coming under the central Educational Authority.

The intention is to give each pupil a medical examination at certain periods during his school career, usually when he enters primary school, when he enters secondary school, and when he leaves school.

The examinations are done by a special medical doctor who visits the school regularly, assisted by one or more school nurses.

Their chief tasks are:

1. To inform the Principal of the existence of any defects of body or mind among the pupils, and whether those defects are likely to interfere with education or be a danger to others.
2. To advise the parents or teachers regarding any remedial treatments that may be necessary.
3. To advise the Principal with regard to measures that can be taken to protect the pupils from unhealthy surroundings, and efforts that may be made to improve their health.

In some areas the child's private doctor may be asked to do the examination, but this is not desirable as most private doctors, unless they are regularly employed this way, do not understand what is required of them. When many different doctors examine the children in any one school there is no uniformity of standards, and the recommendations are often confusing, and the Principal loses direct touch with what is going on.

If the School Board or Principal invites a private doctor to examine all the pupils, the educational aspects should be explained to the doctor.

As has already been mentioned, if the teachers can sift off the obviously sick, much time can be saved.

In any walk of life, a doctor can only *advise* us what we should do about our health. It is up to us to follow his advice or not, as we may choose. Similarly, in school, it is the teacher (Principal) who is responsible for seeing that each child is fit to be there. The doctor or nurse cannot be responsible for the education implications resulting from the child's state of health.

It should be remembered, however, that the School Medical Examination affords an opportunity to the parents to discuss their child's *health* with the doctor. They may be worried about something of which the teachers are quite unaware. Many parents, if the child has not got anything obviously the matter, do not like to go to an ordinary curative doctor, but will welcome the chance of a medical "overhaul" at school.

The school doctor will notify the Principal several weeks ahead of his visit, and will want to know how many children there are to see. Those whom he will see are:

1. All newcomers and leavers (Routines).
2. All those whom the teachers think might be sick in some way (Specials).
3. All those whose parents want to consult with the doctor (Parent's Request).

An invitation should be sent to all parents of the children to be examined, asking them to be present, stating the approximate time. It is highly desirable that parents should be present because the doctor will not only want to know about the child's past, but will also want to discuss his future.

The room for the doctor should be set aside. If it is large enough, the weighing, measuring, eyesight and hearing may also be done there. If not, a separate room will be required. One of the nurses does these tests, assisted by a teacher.

A changing room, and a waiting room for parents are also desirable.

The doctor's findings will usually fall under the following headings:

1. Those children who need actual *treatment* at once:
   e.g. Needing glasses.
   Needing dental attention.
   Suffering from some illness such as tuberculosis, bilharzia, or enlarged tonsils.

2. Those children who are physically unfit, and need special handling at school:
   e.g. Children with weak hearts—unfit for physical exercise.
   Delicate children—unfit for any hard work.
   Malnourished children—in need of extra dietary supplements.

3. Children suffering from some *handicap* which makes it impossible for them to continue in ordinary school.
   e.g. Children with very bad sight.
   Children severely deaf.
   Children severely psychologically maladjusted.
   Mentally deficient children.
   Children with orthopædic defects, who will need years in a hospital-school.
   Children with a severe stutter or stammer.
   "Delicate" children, unfit for ordinary school life.

In the first category the doctor gives a note to the child's parents and tells them to go to their private doctor or hospital. The School Medical Service does not undertake any *treatment* (except very minor things). It is merely an *advisory* body.

In the second category, the doctor discusses the case with the teacher, and advises teacher and parent.

In the third category, the Principal and parents will be informed in due course by the Education Authorities of the special arrangements that have been made.

In some cases the school doctor will send the child for specialist opinion before deciding what should be done.

During his visit the School Doctor will also do the *immunizations*.

Special Health Surveys

From time to time Medical Officers of the Public Health Authority may come to the school to conduct special health surveys. The object may be to determine the amount of any particular illness that there is in the school population.

Some of the types of diseases that are surveyed in this way are:

Malaria—by blood smear, and spleen measurement.
Syphilis—by blood test and examination.
Tuberculosis—by X-ray and by injection test (tuberculin test).
Bilharzia—by urine test.
Intestinal worms—by examining the faeces.
Skin parasites—by examining the skin.
Malnutrition—by examination.
Physical fitness—by special exercise tests, and many others.

In such cases it is not usual to invite the parents though they should be informed. The teachers have no duties except to help the Medical Officers with organizing and with clerical work.

Chapter Nine

DISPOSAL AND TREATMENT OF SICK OR ABNORMAL CHILDREN

The facilities and resources available for treating the pupils will naturally vary considerably with the type of school. It will vary from the large city school where there is a full-time nurse available, to the small mud-and-thatch one-roomed school in the depth of the rural areas, miles from medical advice of any kind.

Where medical help is readily available, the Principal must of course see that the pupils get the advantage of it. In such cases the teachers will need to do very little medical work except to recognize those who need attention.

Where medical help is far distant and expensive, the teachers must, in the child's interest, do all they can on the spot, using their discretion as to which cases must be sent for more expert advice.

The following pages are written assuming that medical advice is not easily obtainable.

First-Aid and Medical-Aid

Every school, wherever situated, should be prepared to give first-aid treatment should an accident occur. Schools in more remote areas should be prepared to give minor medical treatment as well.

Remember that the parents must always be informed *at once* of any accident or sickness occurring to their child.

First-Aid Equipment. There should be available in the school in an easily accessible position a box containing the following items:

Triangular bandages (calico)
Rolled bandages (open wove)
Packets of sterile gauze dressings
Packets of sterile cotton wool
Burn ointment flavine emulsion is the most useful, e.g. "Burnol")
Vaseline (the yellow sort)
Disinfectant (Cetavlon, Dettol or Pinex)
Potassium permanganate crystals
Tincture of iodine
Forceps
Safety pins
Scissors
Sticky plaster
Blanket

In some areas the Education Authority will provide a First-Aid Box of this sort, on request.

First-Aid Treatment

Cuts and abrasions. The object is to remove any foreign matter, such as glass or stones or dirt. This is best done by swabbing with cotton wool dipped in disinfectant lotion. If the blood has already clotted be careful not to swab it away, or bleeding will start again. Then place some Vaseline on a piece of sterile gauze (fresh out of its packet) and place it on the wound. Cover with cotton wool, and bandage firmly.

For small cuts apply tincture of iodine.

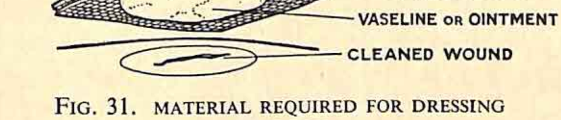


FIG. 31. MATERIAL REQUIRED FOR DRESSING A WOUND

Bleeding wounds. Press the sides of the wounds together with a large piece of gauze. Hold in position until the bleeding stops. In open wounds press rolled-up gauze into the wound. If blood is gushing out in spurts from the wrist or leg, apply a tight tourniquet (pronounced tourni-kay) to the upper end of the limb—but for only fifteen minutes at a time. (See First-Aid textbooks for details, which should be learnt *now*, not when the accident happens.)

Broken bones. Using triangular bandages fix the whole limb to two light planks or sticks so that no joint can be moved. In the case of the arm tie the arm and splint to the side of the chest. Where it is a broken leg, tie the two legs together with a long plank between them. Take the patient to hospital.

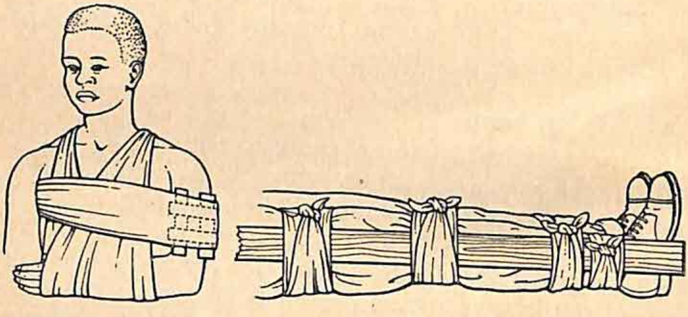


FIG. 32. HOW TO TIE UP BROKEN BONES WHEN TAKING THE PATIENT TO HOSPITAL

[Notice how the broken humerus is not only splinted with two small bits of wood, but it is also fixed firmly to the body. A broken tibia is fixed between a plank and the good leg. If the femur is broken the plank should be long enough to reach the arm-pit, and be tied to the body as well as to the good leg

Broken ribs (shown by painful breathing). Tie a bandage, scarf or belt firmly round the chest to restrict breathing to a minimum. Take the patient gently to hospital.

Broken back (shown by painful back and lifeless legs). See that the patient is carried and lifted face downwards without twisting or bending the back. Take the patient very gently to hospital.

Compound fractures (where the broken ends of the bone are sticking through the skin). Do not attempt to straighten the limb. Fix it very securely in the position in which it is found, so that no further movement is possible. Take the patient quickly and gently to hospital on a stretcher or bed.

Concussion (unconsciousness due to a blow on the head). Lie the patient with the damaged side uppermost. If unconciousness appears to be getting deeper take to hospital at once. Keep him lying down for several days after consciousness is regained.

Burns. If small, apply burn ointment to the raw surface. Cut open blisters that are obviously going to break anyway, and apply ointment. Leave small blisters.

Extensive burns: wrap the child in a blanket and take him quickly but gently to hospital.

Do not apply iodine to burns.

Chemical burns. Apply dilute alkali to acid burns, and dilute acid to alkali burns. Otherwise wash with plenty of running water. Cover the area with Vaseline. If in the eye, wash with plenty of water and keep the eye bandaged shut.

Asphyxia (breathing stopped, due to drowning, choking, electric shock, gas poisoning). Apply artificial respiration at once. See that there is no mud, weeds or vomit in throat.

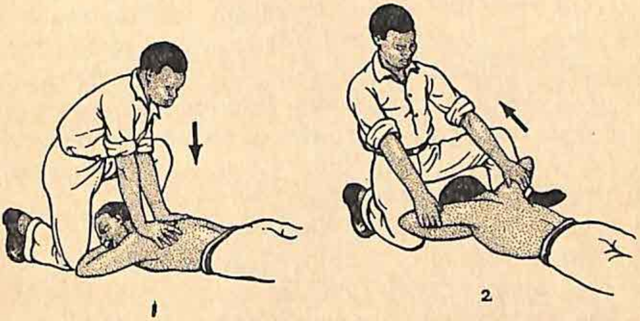


FIG. 33. THE TWO ACTIONS OF ARTIFICIAL RESPIRATION

Number one squeezes out the air and water. Number two draws air in. The arrows show the direction of the movements

The patient lies face downwards, head on one side, tongue out. Keep him warm. First press on his back to squeeze out air and water, then pull up his arms slowly to draw in air. Do this about fifteen times a minute, i.e. half as fast as your own breathing. Do not give up for many hours, or until the doctor says the patient is dead. In the case of a child tilt half upside-down about forty times a minute (Eve method).

Artificial respiration should be rehearsed by all First-Aiders so that they can act without delay in an emergency.

Shock. When a person is seriously injured by a broken bone, a large wound, or a burn, death often results from the shock. This causes the heart to fail. To prevent shock is the most important duty in all first-aid work. Shock is made worse by pain, fear, loss of blood, cold, heat and any exercise, such as attempting to stand up.

The rules to prevent shock are therefore:

(i) Try not to give the patient any more pain, i.e. move him gently, fix broken bones securely.

(ii) Reassure him by encouraging words.

(iii) Stop loss of blood.

(iv) Keep him warm (but do not overheat him. Books written for the cold climates of Britain and America tell you to heat the patient by means of hot bottles and blankets. This is only to be done in cold weather; overheating is bad for the patient.)

(v) Tea or other drinks may be given if the stomach has not been damaged. This helps to restore lost blood.

(vi) Do not give alcohol. A cigarette is permissible if the patient wants one.

(vii) Keep the patient lying down.

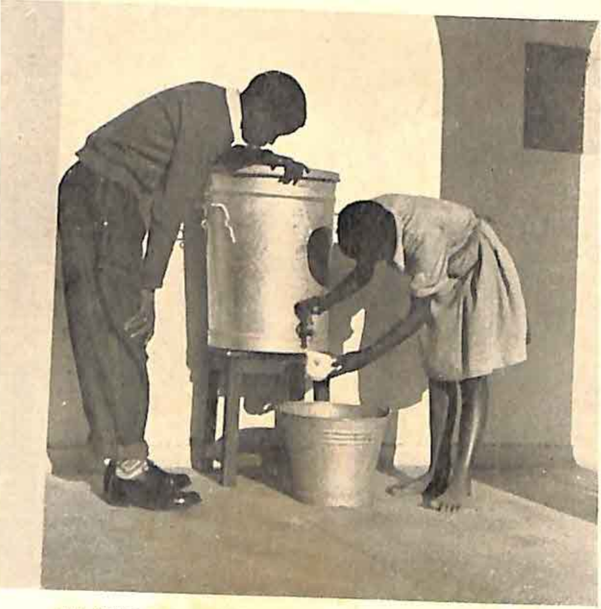
(viii) Take him to the doctor or hospital very gently, not jolting over rough roads.

(ix) Telephone to the doctor or hospital beforehand if possible, if it is a serious accident, so that they can be ready for him.

A SUCCESSFUL SCHOOL GARDEN. NOTE THE FURROWS. EACH HAS TO BE FILLED WITH WATER ONCE A WEEK.

AN EASILY MADE RUBBISH HEAP FOR MAKING COMPOST

WELL-LIGHTED CLASSROOM. THE LARGE WINDOWS ARE ON THE PUPILS' LEFT HAND SIDE. THERE SHOULD BE A STOEP OUTSIDE, HOWEVER, TO KEEP THE DIRECT SUNLIGHT OFF THE BLACKBOARD, AS THIS IS TOO DAZZLING.



AN EASILY MADE WATER TANK. NOTE THE LID.

Electric shock (see Asphyxia, page 223).

Mental shock. This is a feeling of faintness or nausea on receiving a fright or bad news. Lie the patient down, give hot tea to drink. Smelling salts may be used. Brandy in small doses is permissible for adults.

Snake-bite. Quickly cut the flesh with a razor-blade as deeply as the snake's teeth probably went. Make it bleed freely, to wash out the poison, by tying a band round the limb above the wound (but do not tie it so tightly as to stop the bleeding like a tourniquet). Rub permanganate crystals into the wound. Carbolic soap is said to be just as effective.

Grit or splinter in the eye (see page 104).

Poisoning by mouth. Give the patient a large drink of milk, then get him to vomit by tickling his throat. Keep his head low so that the vomit does not flow into his windpipe.

If acid has been swallowed give dilute alkali (washing soda).

If alkali has been swallowed give dilute acid (vinegar).

Medical-Aid Equipment. In schools far from clinics or hospitals, the Principal may keep a box containing the following:

Ringworm ointment (undecylenate or what your dispenser or chemist recommends).

Healing ointment (ung. hyd. ammon. or what your dispenser or chemist recommends. There are many different kinds).

Sulphur ointment
Gentian violet (1 per cent)
Aspirin tablets (5 grains each)
Sal. volatile (smelling salts)
Eye lotion (zinc sulphate 0·1 per cent)
Ear lotion (saturated Glauber's salts solution)
Bicarbonate
D.D.T. 5 per cent powder
Epsom salts

Paludrine or Mepacrine tablets or what the Medical Officer orders (in malarious areas)
Cod-liver oil
Kaolin or diarrhœa medicine
Thermometer
Spoon
Eye dropper

Medical Treatment

(a) Minor Conditions

Septic sores and Impetigo. Bathe off the crusts with cotton wool dipped in disinfectant lotion. Apply healing ointment to the raw surface. Repeat every day. In long-standing cases change the ointment every few days. Gentian violet solution may be used, especially on the face. Children with impetigo should be kept away from other children, especially they should not share towels or clothes. Bad cases should be sent to a clinic or hospital.

Scabies (small itchy spots, especially on wrists and abdomen; not on face). There is a definite routine which must be followed for successful treatment of this disease. The child is given a hot bath and scrubbed all over with a hard brush and laundry soap. Sulphur ointment is applied all over his body (not just on the spots) except the face and head. The child then puts on clean clothes and sleeps in clean sheets that night. Repeat for three or four successive days. If necessary repeat a week later. The rest of the family usually need to be treated in the same way. Blankets and bedding should be boiled to kill the scabies mites.

Children with scabies should be kept out of school.

Ringworm. Rub the affected place with ringworm ointment every day. Some types of ringworm are very resistant. It may be necessary to try other sorts of ointment. Children with ringworm are not allowed in school.

Conjunctivitis (red eye). Bathe by putting in drops of eye lotion three times a day. Keep the eye bandaged between whiles. Do not let the child rub his eyes.

If no improvement in a few days send to the doctor. Corneal damage, or trachoma, must be sent to the doctor at once.

Blepharitis (sore and swollen eyelids, often with pus). Bathe in hot water to which a little Epsom salts has been added, three times a day.

Squint (one eye is not used properly). Cover the good eye, the eye that is being used, with a bandage. This will make the child use the lazy eye. Severe or long-standing cases must be sent to an eye department at a hospital.

Earache. If severe enough to keep the child awake at night, send to the doctor. Very mild cases may be relieved by applying a hot poultice.

Discharging ear. This is a difficult thing to cure (see page 106).

Boils. These can be painted with iodine. Do not try to squeeze out the pus.

Abscesses are large boils. Do not cut or prick them. Apply hot poultices to draw out the pus. Send to a doctor if getting worse.

Tropical ulcer. These are best treated by a doctor. If this is not possible keep the child lying down at home. Bathe with hot Epsom salts three times a day. Apply healing ointment. Give the child extra fruit, vegetables and meat.

Common cold in the nose. There is no satisfactory treatment for this condition. The child should stay at home, especially if the weather is cold and wet. Hot drinks (tea, fruit juice or vegetable soup) should be given. There is a risk that the cold may go down to the chest, especially if the child gets chilled.

Hay fever (watery nose and eyes) occurs in the summer due to inhaled pollen irritating the nose. The dispenser will provide a suitable remedy.

Cough. A simple winter cough, where the child is otherwise quite fit, can be treated by giving a teaspoon of fish-liver oil, three times a day. If the child is sick or feverish keep him at home in bed. Other simple cough remedies are:

hot fresh milk; hot lemon juice with honey; hot onion soup. Get medical help if he seems to be getting worse.

Sore throat. For mild cases give the child an aspirin to suck three times a day. Severe cases send to the doctor. Children with sore throats should not be allowed in school.

Toothache. Give an aspirin four times a day. Obtain dental help if possible. Do not get the tooth pulled out if there is a chance that a dentist can save it by filling the cavity. If possible collect a batch of children, all needing attention, to send to the dentist. Make the arrangements with him beforehand.

Lousiness. Lice in the hair or clothing can nowadays easily be got rid of by D.D.T. powder. Rub the powder on the hair and sprinkle some between the clothes and the skin. Repeat every few days to kill off those that hatch from the eggs (nits) in the hair and clothes. Do not use liquid D.D.T.

If D.D.T. is not available, scrub the body thoroughly all over. Comb the hair with a fine tooth-comb—or better, shave it off. Boil the clothes.

Fainting. Lie the child flat in a cool place; loosen the collar. Get him to breathe the fumes of sal. volatile.

If this occurs in a well-ventilated place, or if it repeatedly occurs, it may be due to other diseases. The child should be sent to the doctor.

Convulsions (*fits*). There is nothing to be done except to place the child in a cool place and allow him to come round. Afterwards allow him to lie quietly for some hours. Later send him to the doctor with a note describing this attack and previous ones.

If the convulsions are accompanied by fever, or in the case of small children and infants, send to the hospital at once.

Headache. Give one or two aspirins. If occurring every day try to find the cause. Test eyes and ears. Enquire about mental overstrain. If accompanied by fever send the child home to bed. If headache and fever lasts more than a day or two, and seems to be getting worse, send to a doctor at once.

Diarrhoea. Give a dose of kaolin mixture. Tell the parent that the child is not to eat any rough food, i.e. no mealies, brown bread, vegetables, fruit. Suitable soft food is milk, eggs, meat, fruit juices or sieved fruit, and, if necessary, white dry bread, biscuits, maizena (corn flour). The diet and medicine must not be continued too long after the child is better.

Acid Indigestion. This may be due to hurried eating, especially excessive porridge and bread. The child should adjust the diet and eating habits. Hot tea or coffee are usually bad for this complaint. In severe cases give a teaspoon of bicarbonate.

Constipation (failure of the bowels to move; the motions are hard). This is usually due to eating excessive quantities of starch (white bread, porridge, mealies, etc.) and not enough fruit and vegetables. (See page 98).

Remember that constipation may sometimes be due to an acute illness, such as one of the fevers.

(b) Major Medical Conditions

Children suffering from these conditions should be sent home with a note advising the parents to seek medical advice. In emergency cases the teacher may send the child direct to the hospital or doctor.

Always send an older child to accompany the sick one, and to make sure the parents are at home.

It will help the doctor if the teacher sends a note describing exactly what he has noticed wrong about the child now, and in the past. If you are taking an emergency case to hospital try to get someone to ring up the hospital to warn them of your coming and to tell them what to expect.

The following are conditions which the teacher will realize are beyond his powers. Children suffering from:

1. Severe or long-continued eye disease, especially if cornea is affected, or if trachoma is suspected
2. Severe earache
3. Severe sore throat

4. Severe or long-continued cough, especially if with fever, pain or breathlessness.
5. Spitting blood
6. Blood in faeces
7. Blood in urine
8. Syphilis or any venereal disease
9. Lumps in the neck
10. Persistent loss of weight or weakness
11. Painful joints
12. Deformities of spine or bones
13. Convulsions
14. Frequent fainting
15. Severe abdominal pain
16. Headache plus fever
17. Headache plus vomiting
18. Any condition which does not rapidly improve after a few days of medical aid by the teacher or parents

Dealing with Conditions which do not need Urgent Treatment

(a) *Poor posture.* If it is certain that there is nothing seriously wrong with the bones or joints, such as rheumatism or tuberculosis, posture can be greatly improved by

(i) Physical exercise
(ii) Good diet

If there is a Physical Education teacher the situation is simple. He will see that the child is given regular exercise to improve the affected parts and to strengthen the muscles. The other teachers, too, should see that the child is always standing or sitting in a way that will improve him.

If the child has weak muscles due to poor food then no improvement is possible unless he is given supplementary diet, particularly milk, meat, peas and beans (for protein and calcium).

Remember that the weakness may be due to general disease such as tuberculosis or malaria.

(b) *Treating malnutrition.* The school should be prepared to undertake to give extra food supplements to those that need it. Apart from the basic diet, described in Chapter 10, extra food may be given. Some items supplementing food that have been found useful for medical treatment are:

- (i) *Protein* supplements:
  - *Milk*—fresh, dried, or thick (tinned);
  - *Meat*—fresh, dried (biltong), fish-meal, meat meal.
- (ii) *Vitamin B group:*
  - Food yeast, ordinary yeast, yeast tablets;
  - "B" complex tablets, Marmite, Bovril.
- (iii) *Vitamin C:*
  - Fresh fruit or vegetables;
  - Ascorbic acid tablets.
- (iv) *Vitamin D:*
  - Fish liver oil (not to be confused with fish-frying oil).
- (v) *Iron:*
  - Iron tonic; Syrup Ferri Phos. (Parrish's Food).

(c) *Dealing with psychological disturbances.* It is important that the teacher should try to find out what is disturbing the child. Some of the more common situations are:

(i) Over-ambitious parents driving the child beyond his ability, resulting in fear of failure.

(ii) Discouragement due to a sense of inferiority at school or at play.

(iii) Feeling of insecurity due to lack of stable home surroundings and of parental love and encouragement. (See also page 178.)

When the cause is obvious the teacher should discuss the matter with the parents in a friendly and tactful way.

Even if the cause cannot be clearly discovered, the effects may be treated and counterbalanced. The following are some of the "mental medicines" that teachers can provide for children afflicted in this way:

The most potent of these are friendship, encouragement and reassurance. Those who have an inferiority complex, whether showing itself as timidity or whether overcompensated as aggressiveness, need to be shown that there are ways in which they are just as good as other people. Those who get no love at home need extra love at school. Those who are burdened by worries caused by lack of security at home gain strength from sincere friendship from their teachers.

Many of these psychological cases may appear "bad", bad-tempered, lazy, bullying, destructive, short-tempered. But the wise and kind teacher will try to understand what is behind it all and never label a child thus. Children like animals, respond to kindness. A "bad" boy is never reformed by calling him bad, but by treating him as though he were basically good and in need of mental help.

It may be necessary for the Principal to remind the teachers to maintain in the school a happy and hopeful atmosphere. When selecting new teachers the Principal should always bear in mind the effect that the teacher will have on the mental climate of the school.

There will remain some cases who are definite "problem children" on whom no impression can be made. Such children, and their parents, should if possible be sent to a Mental Health or Child Guidance clinic, if one is available. There the doctor, a specialist in psychological disorders, will be able to deal with them. The object of such clinics is to try to save these children from eventually ending up in an asylum for the insane.

Careful handling, and understanding, of these psychologically upset children will not only reduce the number of lunatics of the future, but make for a more sane and stable nation.

(d) *Dealing with mental deficiency*. Children suspected of being mentally deficient should be sent to a school psychologist, or school medical officer experienced in this work. Only experts can diagnose this condition with certainty.

Such experts will also advise as to what sort of education will best suit the child.

Teachers should hesitate to keep out of school a child who appears ineducable because of mental deficiency, unless they are sure of their case, otherwise an injustice may be done.

(e) *Defective vision* (*poor eyesight*). At Routine Periodic Inspection a number of children will be found suffering from poor eyesight. A list should be made of these and arrangements made for them to be sent to either a private optician or to a hospital or welfare organization where their eyes can be properly tested and glasses obtained if necessary.

Where this is not immediately possible, children with poor sight should sit at the front of the class. They should not be given books to read with fine print, and should do no reading by artificial light.

Children who are partially or completely blind need to attend a special school. The local Welfare Officer or the Director of Education will be glad to hear of such cases. They will make the necessary arrangements.

(f) *Deafness*. Slightly deaf children should sit at the front of the class, and teachers should remember their handicap.

Completely deaf children are usually dumb as well. These children can only be educated in a special school.

Procedure with Children Suffering from Infectious Diseases

The object is to exclude (keep out) from school classes any child suffering from a disease likely to be caught by others.

It must also be remembered that those who have been in *contact* with the child, his brothers and sisters, or those in the same dormitory, may be developing the disease later. Since diseases are often infectious for several days before the signs appear, these "contacts" must also be kept out of school classes. Such people, kept away from others, are said to be "isolated", or "in quarantine". If the signs have not appeared after a certain period (quarantine period or incubation period) it can be assumed that the child will not get the disease and can be readmitted to school. "Immune contacts", those who have previously had the disease, or who have been artificially immunized are not excluded from school.

Disease	*Patient returns to school*	*Contact returns to school*
Impetigo	When healed	(not excluded)
Scabies	When healed	(not excluded)
Ringworm	When healed	(not excluded)
Dysentery	When healed	(not excluded)
Measles	After two weeks	Seven days after patient
Whooping cough	After six weeks	Twenty-one days after last contact
Smallpox	After four weeks	All home and school contacts to be vaccinated at once. Return after successful vaccination
Chickenpox	One week after cure	(not excluded)
Mumps	One week after cure	(not excluded)
Diphtheria	When cured	Seven days after last contact

In the following cases the Principal should consult the doctor or medical officer of health about the patient and contacts: syphilis, gonorrhoea, tuberculosis, leprosy, typhus, typhoid, plague, polio, yaws.

The following diseases, though due to "infections", are not spread at school: bilharzia, malaria, tapeworm, hookworm, sleeping sickness, rabies.

When in doubt consult the doctor.

Principals of boarding schools may be required by law to report all infectious diseases to the local health officer.

Principals, as members of the community, should also report the occurrence of any suspected infectious disease, that is not being dealt with in a proper way.

Chapter Ten

HEALTH PROMOTION AND PROTECTION IN SCHOOL

The teacher's job with regard to the pupil's health is not merely to discover those who are sick and to deal with them effectively. He must also see that everything is being done during school hours to promote the health of all the children. That is to say, everything must be done that will help to make the children fit and strong. At the same time they must be protected, as far as possible from the influences that are harmful to health.

It will be remembered from Chapter 2 that the Agents of Health are, among other things:

1. The right sort of food
2. Exercise
3. Cleanliness
4. Protection from injury
5. Happiness

and that the agents of disease, among other things, are:

1. Germs
2. Accidents
3. Cold
4. Fatigue
5. Worry, unhappiness

Putting all this together it is clear that we shall be promoting and protecting health if we see to some of the following:

1. See that the children are properly nourished.

2. See that the air they breathe, the food they eat, and the water they drink is clean, and free from germs.

3. See that they are not overtired, or strained. See that the buildings admit enough light, that the desks do not harm posture, that the hours of work are not too prolonged without rests.

4. See that all children are immunized against as many diseases as possible.

5. See that all precautions are taken against accidents, and that if accidents occur, they can be dealt with.

6. See that the children's bodies are exercised and minds made elastic.

7. See that the "atmosphere" of the school is a pleasant and happy one.

8. See that the school sets an example of hygienic living, and that it induces those habits of living, and that appreciation of cleanliness and tidiness, that will stay with the children for the rest of their lives.

Many of these points have already been dealt with in other parts of this book. The rest will be covered in the pages that follow.

It is commonly said that an ounce of practice is worth a ton of precept. Nowhere is this more true than in School Hygiene.

The hygienic state of their school will make a deep impression on the pupils, either for good or for ill. The importance of having a school built and run according to the best hygienic principles, therefore, cannot be over-emphasized.

School Feeding

School feeding is a controversial matter. Many people say that it is the parents' job to feed the children properly. Undoubtedly this is true, but unfortunately many parents are too ignorant or too poor to be able to do so. If teachers are genuinely interested in the *health* of their pupils, in addition to their examination results, they will not mind the extra burden of trying to improve the children's nutritional state.

But there is an additional reason why teachers should be interested in whether their pupils are well fed. It is this. Children whose brains are not well nourished cannot learn so well or so fast as those who are properly fed. The teacher's work is made more difficult if the pupils are malnourished.

All the world over we find that extra food is provided by the education authorities for use in those schools where the children of the poor and ignorant come to learn. In the types of school where the children bring their own midday "lunch" with them, the teachers always supervise to see that health-giving foods have been supplied by the parents. In big towns there is often a central school kitchen, where the food for all the schools is cooked. It is then taken out in special containers to the various schools. In rural schools each school often has its own kitchen.

Where there is a school kitchen, it must be run hygienically. It should be in charge of a responsible person. Children's mothers can take it in turns provided they accept responsibility. The kitchen must be kept clean, the food must be stored in a cool place away from rats and flies. There must be plenty of clean water. Those working in the kitchen must know of the great harm they might do if they let disease germs get on to the children's food; they should always wash their hands after going to the lavatory, and stay away when suffering from a sore throat or diarrhoea.

There is, however, no real need for a *cooked* meal. A kitchen is an expensive luxury, and uncooked food is often more nutritious than the cooked kind (see later).

The *object* of a school feeding scheme should be:

(*a*) To provide the items of diet most needed by the child.

(*b*) To improve the child's eating habits.

Under the first heading we must remember that the object is to see that the total variety and quantity of food eaten by the child during the day is properly "balanced". The reader will remember from Chapter 3 that the most important types of food are those containing protein, and that protein is very necessary for health. He will also remember the other types of food that contain such things as carbohydrate, fats, vitamins, minerals and cellulose.

If at home the child is getting mostly carbohydrate, as is so commonly the case in African households where rice, mealie-meal, stamped corn (samp), yam or cassava is the main dish, then the school should provide the other items. If the home is, however, providing a satisfactory diet, then all the child will need at school is something to give him the "energy", the fuel, in order to work efficiently during the day, that is to say, in such circumstances the school could safely provide carbohydrate only. This latter state of affairs is exceptional, however.

The kind of food that can be supplied will naturally depend on the money available to the school. In the following examples it is assumed that protein, vitamins, minerals and roughage are chiefly needed. Vegetables and fruit provide all these items except protein; the former have the advantage of being free if the school garden is functioning properly. The meal should therefore contain both protein, and either fruit or vegetables. Carbohydrate should be given in addition, for energy. A sweet or lump of sugar may be given at the mid-morning and mid-afternoon breaks.

(a) **Cooked Meals.** This should be some sort of *soup* or *stew*, containing:

(i) *Protein.* The protein is provided by either meat, beans, peas, soya-beans, groundnuts, powdered skimmed milk, meat-meal, fish-meal, or something similar.

(ii) *Vegetables.* Onions, carrots, cabbage, pumpkin, wild vegetables, etc. Potatoes or yams may also be included, and flour "dumplings".

The flavour is improved if some or all of the ingredients are first fried or roasted. A little fat also helps.

Cabbage and other greens should be added to the soup or stew about ten minutes before serving.

With the soup or stew some sort of carbohydrate is usually served, either brown bread, samp, corn, rice, stiff porridge, pounded yam, or cassava.

(b) **Uncooked Meals.** (i) *Milk* is the ideal food for children, but it is not always easily obtainable. Its chief nutritional value lies in its high protein content. Skimmed milk is practically as valuable as whole milk, and is much cheaper.

The thick (sour) milk is the kind most popular in Africa, and is more convenient to handle. It is just as nutritious, in fact probably more so. It is often more easily digestible. It is also less likely to contain disease germs. Sweet milk should be boiled, or bought already pasteurized, unless obtained from a dairy under strict sanitary supervision.

Powdered skimmed milk is also convenient, but has to be made up into a drink such as cocoa or coffee, with sugar, before children will drink it. Take about one-eighth of a pint of powder to every pint of water.

(ii) *Meat*. In southern Africa often the only uncooked meat available is *biltong* (dried meat). This is highly nutritious and very popular with the children. Biltong is not so expensive if we remember that ordinary meat is threequarters water, whereas dried meat is all protein. Much less is therefore needed. (Fresh meat must of course be cooked before eating.)

(iii) *Fruit*. Fresh fruit is always best if available, e.g. oranges, grapes, or tomatoes. Dried fruit is not to be despised, however. Raisins are probably the cheapest and most popular type of dried fruit.

(iv) *Vegetables*. Almost all types of vegetables can be eaten raw, except potatoes. Indeed they are better raw, containing more vitamin C. Carrots and fresh peas are popular. Lettuce, cabbage, radishes, parsley and types of wild vegetable are also well received.

(v) *Bread*. Brown bread is the only type of bread any school should supply, as it contains extra vitamins, cellulose and minerals. If butter or dripping can be added, so much the better.

The second object of the school meal is to encourage good eating habits. The meal should be a definite sit-down meal, the children assembling at their places in orderly fashion, with due quiet and good manners. No child should be allowed to start eating until grace has been said. No child should be allowed to leave until the meal has finished. Children should take it in turns to act as waiters and wait on their fellows.

In African conditions the meal may with advantage be eaten out of doors, the children sitting in orderly rows or circles on the ground. In the open air they will have the opportunity of refreshing themselves, and absorbing a little sunlight.

School meals also have the effect of teaching the children not to be too *conservative* in their eating habits. They widen their taste, and get them used to eating a wide *variety* of foods. The sign of the uneducated man is one who says, "I cannot eat that sort of food; it is not what I am used to."

The School Garden. This can be of great educational and nutritional value to the school. Every school should have one, but no Principal should attempt a school garden unless he is determined that it shall be a success, realizing that its success or failure will be a public demonstration. It will mean a lot of hard work, especially if water is scarce.

Many teachers do not seem to realize that garden plants need a constant and regular supply of water. In many parts of Africa we cannot depend on the rain for this, and must give water from a bucket in liberal quantities. Roughly speaking, if there is no rain we can say that each large cabbage or spinach will drink at least one bucket per week.

Easy vegetables to grow are onion, beetroot, carrot, pumpkin, spinach, beans and peas. More difficult are cabbage, lettuce, potatoes and tomatoes.

Intending gardeners should go to their local agricultural demonstrator for advice. Important points to remember are:

(1) Plenty of water, regularly with no gaps longer than a week. Baby plants need water daily. During the holidays the garden must be watered, just as cattle need water on Sundays.

(2) Put in plenty of *humus*, from compost or from cattle manure.

(3) *Rotate* your plants, so that the same type of plants is not grown again on the same spot.

(4) Keep down the *weeds*.
(5) Keep the surface loose, by regular *hoeing*.
(6) Dig *deep* before every new planting.

The School Environment

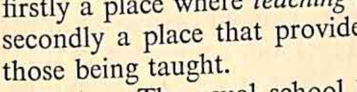
(a) The School Buildings

Unfortunately many of the larger schools are designed and built without consulting the teachers who will have to work there. But all teachers should nevertheless have an intelligent knowledge of the points to be considered.

Smaller schools are still often designed and built by the Principal himself. In such cases money has often been hard to collect, so that it is all the more important that it should be spent to the best possible advantage.

In designing a school it should be remembered (although it is obvious) that the *function* of the building is to provide firstly a place where *teaching* can be most easily done, and secondly a place that provides no strain on the *health* of those being taught.

Design. The usual school has several classrooms. It is more economical to plan these so that they are in a row adjoining, rather than as separate circular huts (rondavels). Rondavels are unsuitable for other reasons, e.g. difficulty of seeing the blackboard. A covered and paved verandah should run along the sunny walls, for shade and shelter. Class-rooms are always built so that at least two opposite walls are outside walls. They should never back on to a third room. They should be built like this



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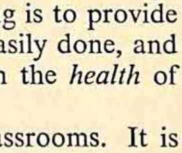

It may be possible to have folding doors between the class-rooms, so that they can be opened up to make an assembly hall.

There should be at least an office for the Principal and if possible a staff common-room. A storeroom is also desirable.

The kitchen may be in a separate block.

It is usual to have the latrines some distance from the classrooms, but they should not be so far away that they cannot be easily supervised.

A cloakroom for hand-washing, hair-brushing, and for hanging outdoor garments during wet weather is desirable but not essential. A bathroom and/or shower is also a great benefit to a school.

Materials. These will depend on what is available locally and at a reasonable price.

Brick is most commonly used for *walls*, and is very suitable. Cement blocks are equally good. Pre-cast cement of various types can be used.

Wood-and-iron buildings are sometimes built, but are liable to be uncomfortably hot.

Pise-de-terre earth blocks may have to be used, as may the wood and mud traditional method, but neither of these is to be recommended.

A damp-proof course should be incorporated in the walls.

The *floors* should be above ground level. They should be made of dustless material, material that can be washed. Wood covered with malthoid or linoleum is probably the most satisfactory. Plain wood is next best. Cement is quite suitable but liable to be cold, although more suitable in tropical areas where white ants attack wood. Tile or terrazzo have been used with success. Asphalt, if made hard enough, is very satisfactory.

The *roof* is preferably of tile or asbestos, as these are coolest. Galvanized corrugated iron (pan) or aluminium roofs have the advantage of keeping out rain but are hot, so that a ceiling is essential to keep off the radiant heat. The space between the ceiling and roof should be well ventilated at the gable ends, so that the hot air can escape. Thatch is very satisfactory and needs no ceiling.

Lighting. Windows should be as large as possible, in total area at least one-eighth of the floor area. Those on the sunny walls should be shaded by a verandah to keep out the direct sun. The windows can be taken right up to the ceiling.

Ventilation. In the parts of Africa where glass is necessary to keep out the wind and rain, the type of windows with panes hinged at the bottom, inward opening, is best for this purpose, as they can remain open during rain. In other areas the windows need only contain netting.

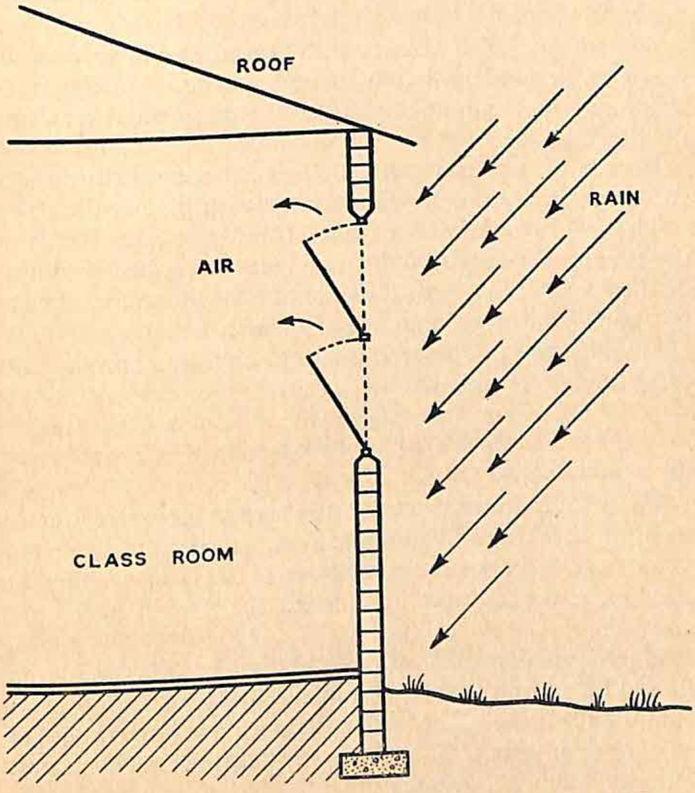

FIG. 34. DIAGRAM OF SUITABLE CLASSROOM WINDOWS, HINGED AT THE BOTTOM, AND OPENING INWARDS TO ALLOW AIR IN YET TO KEEP OUT RAIN

The door should be in the wall opposite the windows, and should have an openable window above it. There may be other openable windows high up in this wall too.

Such an arrangement allows a continuous cross-current of air.

Interior decoration. The walls and ceiling should be a light colour, cream or white.

Size of classrooms. Classrooms are between 500 and 700 square feet, and should hold not more than thirty to forty pupils. The ceiling should be at least 10 feet above the floor.

Furnishings. The *blackboard* is on the wall so that the windows are on the left of it and the door on the right. The pupils sit facing the board, so that the light comes from their left.

Boards of a colour other than black are said to be less strain on the eyes, e.g. yellow board with blue chalk.

The front row of desks should be at least eight feet from the board. Desks with individual chairs have been found to be the best. The chairs should be of a height so that the feet just touch the floor, and the desk of a height so that the elbows just rest on the desk when the child sits upright. The front of the chair should be just under the edge of the desk.

(b) Water Supply

All schools should have a plentiful supply of water for washing, drinking and cooking. Neither the children nor the school can be kept clean without it. In hot weather the children and staff need to quench their thirst at frequent intervals.

Where possible, as in urban schools, a *piped* water supply should be laid on from the municipal system.

Failing this the school will have to devise its own method of obtaining water. The method will depend on the availability of water and money.

Wells, of the bored-hole type are the most satisfactory in Africa. They are expensive to install, however.

Dug wells are possible in some places. These wells are very liable to become dirty from (1) rain washings from the surface of the ground, or (2) people throwing things in. Such wells should therefore be constructed according to hygienic requirements (for details see textbooks).

If the Principal is in doubt about the purity of the water he should ask a member of the Public Health Department to test it.

Rainwater is extensively used, but is often insufficient. It has the merit of being free from disease germs. All roofs should be fitted with gutters and collecting tanks. This may not be permissible in malarious areas, however.

River-water or *dam*-water is nearly always dirty and may contain disease germs. If dirty it must be clarified by filtration. It must always be boiled. This necessarily limits the quantity of water available.

Whatever way the water is obtained, it should be stored in a *tank* with a *tap*, and fitted with a *cover*. The habit of putting a bucket of water on the floor, and a mug beside it which is dipped into the water, drunk from, and then put back on the floor, cannot be too strongly condemned. A brand-new rubbish bin makes a good tank. Any handyman can fit a tap to it.

The tank should have a specially built stand, several feet off the floor. A bucket should be under the tap to catch the drips.

If possible each pupil should have his own mug to drink from. Sharing a mug is one of the ways in which diseases of the face and mouth are spread.

(c) Washing Facilities

A wash-basin where the children can wash themselves is essential in any school. No child should be allowed in class with dirty hands or face. Children should also be taught that they *must* wash their hands after going to the latrine.

The basin should be placed on a bench in the cloakroom, or failing that, on the verandah (stoep). A bucket of water and a dipper stand beside it. This water need not be pure drinking water, but in such a case all children must be warned not to drink it. A spoonful of dip or Dettol may be added to the bucket.

Soap is liable to disappear if left on the bench. Dilute liquid soap in a bottle with a small drip-hole (e.g. a vinegar bottle) serves equally well.

Each child should have his own towel if possible, as diseases of the skin are spread this way. Failing that, roller towels should be provided. These should be replaced fresh each day. In hot weather no towels are necessary.

Where there is a piped water supply a shower-bath should be provided, one for each sex. Their use should be compulsory after physical education.

An immersion bathtub is useful for bathing dirty children from poor homes.

(d) Latrines

Amazing as it may seem there are still many schools in Africa that have provided no latrines for their pupils.

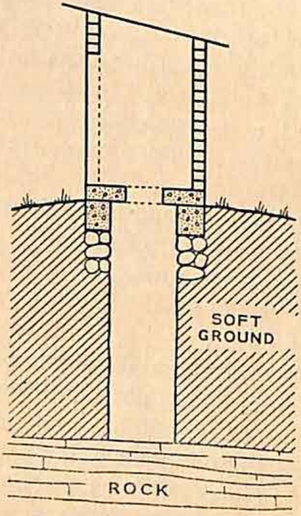

FIG. 35. DIAGRAM OF A DEEP-PIT LATRINE

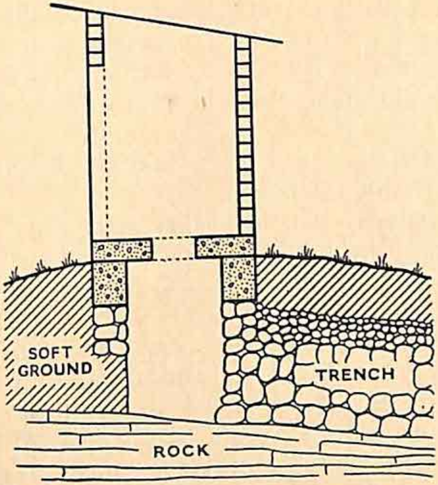

FIG. 36. SHALLOW-PIT LATRINE, WITH SOAKAGE TRENCH FILLED WITH LARGE STONES IN THE DIRECTION OF SLOPE OF ROCK

The contents of the pit must be kept liquid by adding water

A school without a latrine need not attempt to teach hygiene in the curriculum, because its practice will be impossible.

Water-flush (w.c.) lavatories are the most satisfactory. They can be kept clean, and they have no smell. But they need a constant supply of water. Children must be taught not to stand on the seat and not to put anything down that might block the pipes, or upset the septic tank if there is one. Children have also to be taught how to use the flush without breaking it.

Of the other types of latrine only the *deep-pit* type is satisfactory. These should be more than 10 feet deep if possible; shallower pits must have a long soakage drain-trench attached and the contents must be kept liquid by adding water. When the contents reach within two feet of the top it should be filled in with clean earth, and a new pit dug. Latrines should not be dug within 100 feet of a well used for drinking water.

The floor of the latrine must be of cement and the aperture in the floor should have a lid for keeping out flies.

In urban areas, or if in doubt, latrines should only be installed according to the specification of the local health authority.

Where there is more than one latrine, the pit is dug in the shape of a long trench.

In some parts of Africa, bucket latrines are still in use. This type of latrine is difficult to maintain in a sanitary state, however, and should not be provided except on the advice of the local health authority.

There should be one latrine to every twenty-five girls, and one to every twenty-five boys. The latrines for the boys and girls should be entirely separated from each other.

In urban areas boys should be provided with a urinal. In rural areas a portable shelter should be put up in the school garden and moved to a fresh place each day.

(e) Rubbish Disposal

Every classroom must be provided with a waste-paper box. These are periodically emptied into a rubbish bin, standing conveniently near the classrooms. The lid of the rubbish bin must be kept tightly on to keep out flies. The best place to put all rubbish that has been collected is on the compost heap in the garden. At the end of each day the contents of the bin are wetted and then emptied into the compost heap and at once covered with a layer of garden earth to prevent the paper blowing away.

If there is no compost heap there should be an incinerator; one can easily be made out of an old oil or tar drum. The ashes of this are spread on the garden.

(f) Playgrounds and Playing Fields

Every school should have at least a large playground. Secondary schools should have at least one playing field in addition.

Playgrounds and playing fields should be covered with grass. A type of grass resistant to the tread of feet is desirable, e.g. Kikuyu. Animals should be kept off the school grounds during term time, as their droppings are liable to make the children dirty.

The playground should include a few trees for shade.

(g) Maintenance

The school buildings should always be kept in a good state of repair.

There should be a cleaner who scrubs the floors and cleans the windows periodically. The latrines, especially, must be cleaned daily.

The pupils are of course taught to keep their individual classrooms, and the playgrounds tidy.

Broken windows, doors, cupboards, desks, etc., should be repaired at once. Dirt and disrepair are extremely bad examples to set before the young.

A repainting and renovating programme should be worked out so that each part of the school is gone over in turn. Such major works should be done during the school holidays.

Immunization

(See Chapter 2, page 1.)

Quite apart from the importance of protecting the individual child's health, it is not fair to the other pupils to allow into school children who have not been fully immunized. The diseases that all school children should be immunized against, in Africa, are:

Smallpox
Typhoid (enteric) fever
Yellow fever
Tetanus
Diphtheria
Whooping cough

If there are cases in the neighbourhood, the health authorities usually also advise immunizing against:

Plague
Typhus

Where there is a school doctor he usually immunizes all new pupils when he visits the school. In other cases the Principal must make his own arrangements. Some of these immunizations are provided free of charge by the government doctors.

Tuberculosis may be added to this list in the near future. It is only done on those children on whom a preliminary skin test shows that they have never previously been in contact with the disease.

Some of the diseases that *cannot* be prevented in this way are:

Malaria
Measles
Bilharzia
Sleeping sickness

In malarious areas, however, protection is obtained by taking a tablet of protective medicine every so often.

Accident Prevention

Accidents have been defined as something that happens to *other* people, never to *us*. But though such words are spoken in jest, many people do not take the possibility of accidents seriously enough. They adopt a fatalistic attitude—what must happen will happen. But in very many cases, if care had been taken, the accident need never have occurred.

Few people realize that accidents are the commonest cause of death in school children. Almost all of such deaths could have been prevented. Accidents are also responsible for injuring, often for the rest of the life time, many many more; thousands of children are injured every year so that they can no longer live a happy and useful life, and so that there is no chance of them ever earning their living properly.

It seems as though the accident death-rate is one of the prices we have to pay for civilization. In the old days there were the dangers a man had to face while travelling through the jungle, or when crossing a river. It seems as though the streets and factories of our modern world are even more dangerous.

Accidents can only be prevented if the people concerned are aware at all times of the dangers.

The school Principal should see to it that the children in all standards are continually reminded of the dangers. A special period should be set aside at least once a year, soon after the beginning of the school year, in which these matters are discussed. Later the children can be made to study and find out for themselves the possible dangers.

Some of the points to be stressed from time to time are:

(a) *Burns*. The dangers of playing with matches. The inflammability of straw, bedclothes, imitation woollen and cotton garments, and of paraffin, petrol.

The dangers of the open fire—the kind of fire that a baby can walk into. The danger of sleeping next to a fire. The danger of people who have fits, falling into the fire.

The danger of boiling water; boiling water should never be in reach of a small child; cooking pots that can easily be upset; the cold water should be put in the child's bath first, before the hot.

The need for precautions in the chemistry laboratory.

(b) *Falls*. The danger of babies falling from high furniture, down high steps, or off verandahs.

The danger of playing on high ladders, scaffolding, bridges, or in trees.

(c) *Suffocation*. The dangers of playing with ropes, accidentally strangling.

The dangers of swimming in rapid rivers, or in the sea.

The suffocation of babies by pillows (or being lain on by their mothers).

(d) *Electric shock*. The dangers of playing with electric apparatus.

The danger of handling electric apparatus when wet.

The need to report broken switches or bulb holders.

Precautions when changing bulbs or fuses.

(e) *Poisoning*. The dangers of leaving medicines and pills lying about where children can get at them.

The danger of confusing bottles, e.g. a bottle of disinfectant for a bottle of cough mixture.

(f) *Traffic*. Care in crossing the street—the need to look both ways, to the right first.

Care in getting on and off buses, trams or trains.

Jaywalking; the proper use of pedestrian crossing places.

The danger of playing among parked cars or lorries; the driver may get in and drive off without noticing the children.

(g) *Wounds*. The proper use of sharp tools, especially in the carpentry and metal workshops.

The proper use of an axe.

The dangers of playing with arrows, catapults or other weapons.

The respect to be paid to moving machinery of all kinds.

Traffic Safety

(1) Schools which are situated on a main road should engage an official, or a policeman, to be on duty when children are coming to school in the morning, and again when they leave in the afternoon. This official should hold up the traffic from time to time to allow the children to cross. Children are allowed to cross only at such times.

(2) Escorts can be provided for young children who have to cross busy streets to get to or from school.

A Healthy Staff

No person should be accepted as a teacher:

(*a*) If he is suffering from a disease which might endanger the children. Tuberculosis and venereal disease are the only diseases likely to fall in this category. Other infectious diseases are more obvious.

(*b*) If his mental outlook in life is unhealthy. That is to say if he is for instance unduly excitable, violent, cynical, sarcastic, cruel, timid, unstable, untruthful, sexually perverted.

(*c*) If he has a severe defect of eyesight; if he has a severe degree of deafness; if he is severely deformed or disfigured.

(*d*) If he has a poor personality; if he is dirty or untidy; if he gives a poor impression.

(*e*) If he has a defect which might shorten his working life. (This rule is applicable to teachers who have loan scholarships, or where there is some pension or superannuation scheme.)

All persons intending to take up education as a profession must have a health examination before they are accepted. The doctor examines the teacher trainee with the above points in view.

From the point of view of protecting the pupils, the risk of tuberculosis is the important matter. Ideally every member of the staff, from the scrubbing-woman to the Principal, should be X-rayed every year.

Teachers suffering from severe coughs, colds or sore throats should not teach until they are cured.

When teachers have been away due to sickness, they should not recommence their duties unless they bring a doctor's certificate to say they are free from infection.

Teachers must:

(*a*) Be able to recognize ill-health in the pupils.

(*b*) Be really interested in the pupils' welfare, apart from their progress at lessons.

(*c*) Understand the different abilities and reactions of children at different ages.

(*d*) Try to treat each child as an individual.

(*e*) Try to be tolerant of weakness.

(*f*) Try to encourage rather than shame or belittle.

(*g*) Try to get the children to work because they are interested, not because of fear of punishment.

(*h*) Avoid making the child excessively worried about his work.

(*i*) Have a sense of humour.
(*j*) Have no favourites.
(*k*) Never use violence.

The School Day

Trained teachers will be already familiar with this matter but a few points with a bearing on health may be mentioned.

The school day should be so arranged as to avoid undue strain or fatigue, and to encourage orderliness, regular habits, and discipline.

The *total time* spent at school should not be more than six hours per day.

Periods of hard concentration should be followed by periods of comparative restfulness. Periods of using the eyes should alternate with periods of bodily activity.

Organized physical *exercise* should be provided daily.

Homework may be given to secondary school pupils provided that there is sufficient light at home, and that the rest of the family co-operate.

After *sickness* pupils should not be driven to make up lost time, because they need to regain their strength gradually.

Children should be encouraged to join activities other than those at school, e.g. scouts, music, earning pocket money.

Examinations should not be made to appear as terrible ordeals that the child has to undergo, but as normal and natural, and by no means fearsome, events in the school life.

Every effort should be made, by means of intelligence or other tests, to put the child in the right standard for his abilities.

The employment of children. It is against the law (in most countries) for children below the age of fifteen to be employed for wages. This is to prevent the exploitation of children by poor parents, as forced work under such circumstances, in addition to their school work, would be bad for their health. Children may, however, be permitted to earn money for themselves, doing small errands, etc., as long as it is not regular employment. Indeed, children may be encouraged to assist themselves in this way, as it develops self-confidence and independence.

There is no objection to children being given work about the house by their parents, and many may have to do light farm duties before or after school, but parents should be warned against overtiring their children.

Discipline. Orderliness and regularity in the running of the school, and happy co-operation by the children is good exercise for mental health.

Discipline can be based on the following:

(*a*) The fostering of a sense of responsibility in the children. Allowing them to make decisions with regard to their conduct.

(*b*) The fostering of team spirit.

(*c*) Instilling a respect for rights of others.

(*d*) The recognition of the need for rules and regulations to ensure smooth and efficient running of the school.

(*e*) The realization that discipline at school results in the highly desirable discipline of self.

If *punishment* is necessary it must be just, prompt and inevitable. Punishment should only be given by persons aware of its psychological effects (see Chapter 7 on Health of the Mind, page 178). Punishment for indiscipline should usually consist of the withdrawal of privileges. Privileges should only be given to those showing a sense of responsibility. Punishment for not doing work should usually be extra work, though harm may be done to tired and hungry children this way. Violence should never be used. Group disapproval is often an effective punishment, but may misfire.

The school "breaks" are a necessary part of the school day and children should not be deprived of this rest-time as a punishment.

The punishment of older children is exceedingly delicate from a psychological point of view. The offender must realize that the punishment is just otherwise you only make a rebel of him. On the other hand by the time the offender is sorry for what he has done punishment is unnecessary.

Points to remember:

(*a*) Look for a cause of the indiscipline or nonconformity, e.g. mental maladjustment, resentment.

(*b*) Try to keep up the child's feeling of personal worth, do not sneer or be sarcastic.

(*c*) Keep the children occupied with interesting work. Idleness and boredom breed indiscipline.

(*d*) The apparent peace due to strict authoritarianism is false and worthless and bad for the children.

The teacher should:

(*a*) Have self-confidence.

(*b*) Have an air of authority.

(*c*) Radiate joy rather than instil fear.

(*d*) Set an example himself, always be punctual, polite and tidy.

Chapter Eleven

TEACHING HEALTH

It is not sufficient simply to *learn* about health; health must be *lived* too if health education is to serve any purpose at all. Teachers must continually bear in mind that the mere presentation of *facts* alone will not produce healthy living. Our aim is to produce men and women who not only *know* about health, who not only have the right attitudes towards health, who not only have the ability to lead healthy lives, but men and women who *are* in fact healthy, and who *are* in fact living healthy lives.

Knowing and living must go together. Teaching must be constantly related to the pupils' real-life experience. No good purpose will be served if the child has knowledge without putting it into practice. This is where the subject of hygiene differs from all other subjects. If a teacher of algebra finds that his pupils get full marks in algebra he is very pleased. A child may get full marks in hygiene in his exam, but unless he applies his knowledge to himself, his efforts at learning and his teacher's efforts at teaching him have been wasted. Take cleanliness for example. A boy may know that all nice people have clean hands, yet his own hands may remain gloriously dirty. He *knows* about cleanliness, but it remains just knowledge and nothing more. He has not applied it to himself, but continues to regard it simply as something the teacher has told him.

Roughly we can divide the teaching of health into the following headings:

1. Health knowledge; the facts of physiology and hygiene.
2. Health skills and abilities; the ability to choose the path of health, the ability to use and criticize health practices.

3. Health attitudes; a scientific attitude towards health matters, and enthusiasm for health.

4. Health habits and practice; the carrying out, as a matter of routine, the various actions which go to make up the healthy way of living.

Put even more simply, the teacher of health should remember these requirements:

Knowledge
Ability
Inspiration
Practice

Unless all four aspects are included in his health teaching plan, then he will have failed in his task.

General Considerations of an Educational Nature

Here we might pause to remind ourselves of some general considerations, particularly applicable to health education.

1. *Teaching from the particular to the general*

Concrete examples, within the pupil's own range of experience, should be used. In teaching physiology start with what the pupil can see of his own body. This is of far more interest to him than say a picture of what a cell looks like under the microscope. Similarly in teaching about food, start with the common foods he knows, then go on to diets and finally to the chemistry of foods.

2. *Make the subject topical*

If there has been an outbreak of smallpox in the country, and if all the pupils have had to be vaccinated, then this is obviously a point from which to start lessons on communicable disease and immunity.

3. *Textbooks*

The lessons should not simply be taken straight out of a textbook, and the pupils made to learn all the long words in a certain chapter. Textbooks should be used for reference only; they should be used as sources of information about a topic that the pupils or teachers have introduced. Each class should have a small library of hygiene textbooks to which the pupils can refer.

4. *Visual aids*

Hygiene as a subject provides plenty of opportunity for using visual methods, models, illustrations, demonstrations, practical lessons, etc.

5. *Avoid unnecessary repetition*

Nothing is so boring as hearing a lesson for the second time. A teacher in say Form III should know exactly what the pupils had when they were in Form I. Where one syllabus covers more than one class, a planned programme should be followed across the various classes.

Considerations Particularly Applicable to Health Teaching

1. *Curriculum co-operation*

All the teachers who deal with the pupils in any one class should help the hygiene teacher by applying their particular subject when possible to the hygiene topic of the moment. Teachers should meet, and plan their lessons accordingly.

If in the hygiene lessons say food is being studied, then we might find

In English, spelling food words, sentences about food, essays about food.

In Geography, areas where food is produced, different foods in different climates.

In History, the influence of food supplies on migrations or wars.

In Mathematics, calculations about various quantities of food.

And so on.

2. *The influence of the environment*

The state of the school with regard to *sanitation*, its lavatories, its water supply, its food preparation, the size of its windows, rooms and desks, its cleanliness and tidiness, is a continuous practical demonstration to the pupils. All the talk in the world will not overcome the impression left by bad surroundings.

The periodic health examination of the pupils is also a lesson in the need to keep a check on one's health. In adult life we ourselves provide the periodic health examination by going to our doctor for a regular "overhaul".

If the doctor gives immunizations the nature and object of these should be carefully explained to the pupils beforehand.

3. *The attitudes of the teachers*

Like the influence of the environment, the attitudes of the teachers can make a strong impression for good or for ill. Are the teachers keen on health? Are they clean and tidy? Are they happy and enthusiastic? Have they got old-fashioned or superstitious beliefs? Do they practise what they preach?

4. *Evaluation*

In most subjects, evaluating the child's knowledge consists simply of giving tests from time to time. This is all right for testing health *knowledge*, but the teacher must also remember that he has to also see that the other requirements are being fulfilled:

What are the child's habits like?

Has a particular lesson brought about any change for the better in the pupil's way of life?

What are his attitudes to health?

Is the child actually healthy in every respect?

Teaching Health in Primary Schools

Formal lessons on physiology and hygiene are not usual in primary schools. At this level the child is taught what to do, but not why he must do it. For example, the young child does not have to know what benefits will result if he washes himself; all he needs to know is that his parents and his teacher like him to be clean.

This is the time when *habits* of living are fixed, and in this connection it should be remembered that bad habits become as fixed as good ones. So at this time not only must good habits be learned, but bad habits must be carefully avoided. The teacher watches his pupils continuously to see that they are practising these good habits and not practising the bad ones.

Bad habits are such things as:

Nail biting
Scratching
Food faddiness
Dirtiness
Nose picking
Bad temper
Ill manners

Good habits are such things as:

Cleanliness of clothes and body
Nose blowing, use of a clean handkerchief
Regular bowel opening
Eating a wide variety of food
Eating slowly
Going to bed early and sleeping well
A pleasing and happy disposition

Health *knowledge* at this age should include some of the following. A child should know:

That wet and cold are bad for health.
That river and dam water are unsafe to drink.
That faeces must be deposited hygienically.
That home and school should be kept clean and tidy.
Which types of food are most health-giving.
The dangers of accidents, traffic, fires, etc.
The dangers of snakes, sick rodents and dogs (i.e. the danger of rabies).
The simple facts of sex physiology.

At the younger levels the children's experience of life is their own home, with its domestic activities, animal husbandry, etc. All teaching will have to start on this basis.

Later their interest expands rapidly and they become interested in communal activities. A sense of responsibility for personal health, and for respecting the health of others can be encouraged at this time. At this time a child's *values* become fixed; he can be brought to value the health of his body and the reputation of his character.

Teaching Health in Secondary Schools

1. *Knowledge*

In secondary schools there is usually a set syllabus of Physiology and Hygiene that must be followed. Briefly we may say that what is required of an educated person is a basic knowledge of the following:

(*a*) The general structure of the body
(*b*) The general workings of the body
(*c*) The care of the body
(*d*) The causes of ill-health and their prevention
(*e*) Communal health activities

2. *Attitudes*

An educated person should have a respect for his body and a desire to keep it healthy.

He should respect the rights of others, should do nothing to cause risk to their health, and should co-operate willingly in obeying regulations designed for the good of all.

He is interested in health, but is not morbidly interested in disease, or imagining that he himself might be sick (hypochondria).

He is not unduly swayed by advertisements for patent medicines.

He has no superstitions about medical science.

He should follow the rules of hygienic living intelligently yet without feeling blindly bound as a slave to them. (Teachers can often do harm to children's mental peace of mind if they make the consequences of breaking such rules sound too terrible, for example, eating too much carbohydrate or drinking unboiled water. The rules of hygiene may be broken a dozen times and no harm may befall, just as a child may run across the street a dozen times without looking at the traffic and yet not get knocked down. The rules of hygiene are what wise people "ought" to do, not what everybody "must" do. Obtaining a correctly balanced attitude to them is a delicate matter.)

3. *Skills*

An educated person can choose a good diet.

He knows what to do in cases of sickness or accident, and can give first-aid and simple treatment.

He knows how to avoid infectious and other preventable disease.

He is able to occupy his leisure time profitably.

He is able to face the world with confidence, mix with others, and make friends.

4. *Practice*

He is clean in body, clothing and habits.

He opens his bowels in a place where his dirt does not endanger others.

He does not spit, and coughs only where it does not endanger others.

He goes to bed early.

He takes regular exercise.

He does not smoke or drink alcohol to excess.

He reports when he is feeling unwell.

He knows the dangers of electricity, machinery, poisonous plants, etc.

He makes himself pleasant to others.

5. *Special topics for the adolescent*

Growing up
Sexual behaviour
Alcohol
Tuberculosis
Physical fitness
Responsibility
Character and personality

6. *Incentives*

Every teacher knows that it is easy enough to teach a subject if the pupils want to learn. The first step is to stimulate the child's interest. He thus becomes eager for knowledge, and eager to put that knowledge into practice. It may be difficult for a teacher to convince his class of the value of learning algebra or Latin, except perhaps as an essential step in the attainment of an examination certificate, and such incentives cannot lead to the practice of that subject for its own sake, which is what we want for hygiene. Luckily in this subject it is easy to stimulate the child's interest, because there are, as we shall see, several important *incentives*. Some of these will probably be grasped readily by the child, others take a little more persuasion.

The desire to grow. Probably the strongest incentive in this connection in any child is the desire to grow; the desire to grow up and do the things that grown-ups do. The child does not need much convincing that only the healthy grow properly. Thus there will spring from this desire to grow, desire to know how to keep healthy. Every teacher should try to keep records of the monthly growth of the children in his class. In doing so he can get the children to help with and take an interest in the proceedings. They can do the weighing and measuring on each other, enter the results in their books and perhaps draw graphs of their rates of growth, if they are at that stage in their mathematics. Not every school can afford a pair of scales, but a tape measure is no expense, and it is even cheaper to draw a ruler on a piece of wall for the children to stand against. (See page 205.)

The desire to excel. Every teacher knows this incentive well and has to use it constantly. It can be one of the greatest incentives to interest in the subject of hygiene; not so much the desire to excel in it as a subject, but to excel in these physical states which result from healthy living. In boys this desire is usually to excel in physical ability; to be strong, to run fast, to jump high, to be a great hunter, or a brave soldier, and so on. In girls this incentive is perhaps weaker but shows itself in the desire for physical beauty, for a good complexion, a good figure and pleasant personality. Only the healthy can have these things. The wise teacher will use opportunities to bring home this lesson as they occur. Sports days are an obvious example. Stories of heroism and feats of endurance can be used as starting points for talks on hygiene.

At the same time, teachers must be careful that the class does not learn to despise the physically handicapped and the cripples, who cannot excel physically through no fault of their own. Obviously here is an opportunity to teach sympathy. The cripple himself must be taught that there are many other great values in life besides physical ones.

The desire to be accepted. Psychologists tell us that this is one of our primitive instincts, and small wonder that it is found so strongly in children. We all feel the need of the approval of the particular group with which we happen to identify ourselves. With the child this group may be his family, or his teachers and schoolfellows, or a small minority "gang" of his schoolfellows. The teacher's work will be considerably lightened if, as far as health is concerned, all these different groups approve of the same sort of conduct. Conflict between parents and teachers can only lead to confusion and mistrust on the part of the child. Similarly, if the "gang" decides that any particular form of behaviour is "sissy", then no persuasion from the teacher will alter things. The teacher's aim therefore will be to influence especially the group leaders and those individuals whom the child respects.

Participation in group activities is another strong incentive. No child likes to be "left out". Such group activities are mentioned later under the heading of methods (para. 2).

Future careers. The teacher can point out that we all can serve society eventually, when we grow up, if we learn all there is to know about health.

For those who wish to become doctors, dispensers, nurses, health inspectors, or pharmacists, obviously they cannot begin to learn too soon.

Those who are to become teachers will need to know all about healthy schools and school children.

Those who are to become parents will need to know how to keep the family healthy.

Some might be community councillors or local government officers who need to know about community health.

Everybody needs to know how to keep himself fit. Everybody needs to know how to help others when they are sick or injured. Everybody needs to know his duties to his neighbours in preventing sickness.

Individual interests. Just as one always teaches from the known particular to the general theory, so one can similarly teach from the personal individual interest to the wider implications.

Most children are interested in something to do with health. They may be worried about their own health, or say their father's health. They may be curious about the workings of the body, or about the facts of sex. Such interests make useful starting points. In order to discover or stimulate these interests the teachers may have to plan a questionnaire for the pupils to fill in, for example:

Do I feel healthy?
Are my parents healthy?
Am I worried about my eyesight?
Do my feelings get hurt easily?
etc.

Alternatively the teacher can suggest topics, making a list and asking the children to vote for the topics that interest them most. For example:

1. A lesson on the structure of a tooth
2. A lesson on how to prevent toothache
3. A lesson on vitamins
4. A lesson on body building

It does not take much imagination to know that most children will vote for lessons 2 and 4, rather than 1 and 3.

Teaching Methods

1. The Didactic Method

The formal classroom lesson has its place, especially in imparting some of the basic factual knowledge required. But it has the disadvantage that, unless carefully done, it does not necessarily improve attitudes, skills, or health practices, and does not necessarily actually bring about any improvement in the pupil's health. The techniques of classroom teaching are, however, outside the scope of this book.

2. The Discussion Method

Psychologists tell us that when we think collectively in a group, our minds are much more likely to be permanently influenced. There are many recognized "progressive" methods of this sort. The general principles of one method are outlined below. There are many others.

The set group discussion is in imitation of what we find outside in real life, where people gather together to decide on a plan of action to solve certain problems.

For a successful discussion there must be the following:

(*a*) There must be a definite problem to discuss; one that permits of a solution that the pupils can discover.

Typical problems are:

Do we get enough sleep?
How can we prevent accidents?
What qualities make a good friend?

(*b*) The teacher does not attempt to *teach*, or to impose his authoritative views. He merely leads and guides the discussion, drawing out opinions. (There is a definite technique of leading a discussion group.)

(*c*) Every member of the group should be encouraged to speak.

(*d*) The group should usually contain at least six and not more than fifteen participants.

(*e*) Discussion is sterile unless there is factual knowledge on which to base opinions. The participants should previously have studied their subject, preferably individually, though their reading can of course be guided by the teacher.

(*f*) A discussion is not a debate. No formal vote is taken, but general agreement with regard to the solution of the problem should be reached.

3. Experimental or Practical Methods

Pupils should always be given opportunities to take part in some activity that either illustrates the lesson, or gives them an opportunity of acquiring some skill.

Demonstrations. These are particularly applicable in anatomy, physiology, posture, choice of food, first-aid and home nursing, etc.

Some demonstrations are more elaborate than others. Points to remember are:

Try out the demonstration beforehand.

Arouse the pupils' interest beforehand.

Demonstrate, explaining the important points in a few words (on blackboard).

Pupils can repeat the demonstration; the teacher corrects mistakes kindly, gives encouragement.

All pupils should be able to see what is going on, or be kept otherwise occupied.

Examples of suitable demonstrations are given in the Appendix at the end of this Chapter (page 278).

Visits. Places of public health interest may be visited; water works, sewage works, public health offices, baby welfare clinic, hospital, factory, etc.

Points to remember are:

The place visited should coincide with the point reached in the classroom, e.g. visit the water works when the lessons have reached water purification.

Tell pupils beforehand what they are going to see, and list the points they are to look out for.

Get permission beforehand to visit the place.

Allow plenty of time.

Discuss the trip during subsequent lessons, and test to see what has been learnt.

Posters and exhibits. Teachers can make their own posters and exhibits, but it is better if the children make them. There is more incentive if the poster or exhibit is to show to the rest of the school, or to the parents on view day, or to be shown in the community outside.

Points to remember:

There must be a definite topic that is to be illustrated.

It should be one that can be conveyed in a short simple message.

The topic should be of interest to those who will see the poster or exhibit.

The children should carefully plan what they are going to do before they start, making rough preliminary sketches.

Suggestions for topics:

"The way germs spread"
"A balanced meal"
"Immunization saves lives"
"Prevent accidents"
"The needs of a young baby"

Dramatizations. Children love to watch, and especially to perform in, little scenes or playlets. Psychologically they identify themselves with the characters, especially if they act the part themselves.

The actors can be placed in the position of others, seeing through their eyes. Thus they would be given the part of a doctor, or a medical officer of health, or of a worried father, etc.

Psychology and mental health can often only be effectively illustrated in a dramatization.

Young children can usually act in a scene from home or street.

Older children like something more dramatic, something with adventure in it, or a scene from history.

The children can often be led to suggest their own topic for a playlet which they can write themselves. Needless to say it will lead out of the part of the syllabus at present being studied in class.

Playlets need not always be elaborate. They need not always be rehearsed. Spontaneous turns, where the participants have to think what to say during the actual action, are often very successful.

The children should always plan, organize and produce the play themselves.

Projects. In a project the pupils actually investigate some local school or community health problem.

The pupils should choose their own project, arising out of their classroom learning. The teacher tactfully modifies it if necessary.

The investigation should be into a definite problem, where there is some chance that the pupils will find the information they seek, and where there is some hope of a definite conclusion being reached.

The pupils themselves plan how to go about the investigation. They carry it out themselves, and judge their success themselves.

This usually implies:

A clearly defined object
The collection of data
The interpretation of data (help is needed here)
Drawing conclusions
Applying the conclusions to the situation, particularly if it is themselves they are investigating

Suggested topics:

An investigation into the variety of foodstuffs eaten by the class in one week.

An investigation into the causes of absenteeism among classmates.

An investigation to discover the adequacy of lighting in the school classrooms.

An investigation to find out the degree to which the schoolchildren are protected from disease by immunization.

4. Films and Film Strips

It is often difficult to obtain a film or film-strip exactly suited to the individual teacher's methods, or to the particular needs of the moment of the class.

Films must be ordered well in advance and the lessons planned to coincide with their expected time of arrival.

Teachers should view the film beforehand, before showing it to the class, to judge its suitability. It should be shown at least twice to the class.

Consult your Director of Education, or Inspector, with regard to the procedure for hiring films.

Film strips are more suitable than films for the following reasons.

The teacher can talk during their showing.

They can be shown at any speed suited to the ability of the class to follow.

They can be wound back to show a point a second time if necessary.

They are cheap and can be purchased, so that the teacher gets to know his own strips.

The projector is cheaper to buy, easier to work and cheaper to maintain.

A list of film strips and their suppliers can be obtained from the Central Council for Health Education, Tavistock House, Tavistock Square, London, W.C.1, England.

A teacher who is also a good photographer can make his own film strips.

5. Non-mechanical Visual Aids

The flannelgraph
The magnetic blackboard
The flip-chart

These are all particularly useful for building up and illustrating an expanding theme.

For example:

The development of the body
The course of a disease
The life history of a parasite

Causes of accidents
The structure of personality
Vital statistics (death-rates, etc.)

Sex Education

All education authorities are now agreed that school children must be given some preparation for the tremendous changes that will take place in their bodies and minds as they grow into manhood and womanhood, and some guide to the kind of conduct that society expects of them with respect to the sexual aspect of their lives. Every educated person should have:

1. Factual *knowledge* of the essential features of the anatomy and physiology of human and animal reproduction;
2. Pure and healthy *attitudes* towards sex and reproduction; a respect for the roles of womanhood, motherhood and family life.
3. A code of morals and a standard of sex behaviour before and after marriage.

Undesirable features, found in the old attitude to sex education are:

1. Children almost always learn an incorrect version of the facts of life from their playmates. Such versions are often frightening, disgusting or unduly exciting. They have the attractiveness of "forbidden fruits".
2. Where parental repression of this topic has been successful, children grow up with the idea that all forms of sex activity are disgusting or impure. This may seriously interfere with marital happiness in later life, especially in the case of women.
3. There still occur many tragedies among young people, either unwanted pregnancies or cases of venereal disease, which could have been prevented if they had been properly forewarned. How often does the heart-felt cry go up, "Oh, why didn't someone *tell* me about this?"

Statistics show that most illegitimate pregnancies occur in young girls under twenty-one years of age. Older girls are wiser.

Beneficial results from efficient sex education should be:

1. Decrease in promiscuity
2. Decrease in venereal disease
3. Decrease in illegitimacy
4. Decrease in prostitution
5. Improved mental health, especially in women
6. Improved relationship between the sexes; improved status of womanhood
7. Improved marriage and family life
8. Fewer divorces

Methods of Sex Education

Some teachers do not feel themselves able to do justice to this subject. Certainly if any teacher feels embarrassed, or in any way awkward, in front of the class when talking about these matters, it is better for him to hand over to someone else. Any suggestion to the children that there is something special, important or secret about the subject is to be avoided.

For the same reason there is no need to invite a doctor, or a "sex education specialist" to give special lectures on the subject. This immediately makes the pupils feel there is something extraordinary about it all. Any normally matured man or woman, married or unmarried, knows all that, and more than, any child need know.

Sex education is not a separate subject. It should be worked into the curriculum with other subjects as the opportunity arises.

The amount of sex education must be carefully graded to the level of development of the class. There is no need for a completely accurate and detailed account which may be far beyond the child's comprehension. As a rough guide we can say that the amount of instruction should be simply sufficient to satisfy the child's immediate curiosity without going beyond it, or arousing more curiosity.

Sex is a subject that children are naturally curious about. This is not surprising when we realize that children are naturally curious about their own origins and the origins of their younger brothers and sisters.

Teachers must be prepared to answer questions from children of all ages. If the questions are frank it is a compliment to the relationship that the teacher has established between himself and his pupils. If no questions are asked it is a sign that all is not well.

Questions must be answered as honestly as possible, and as simply as possible. There must be no sign of embarrassment, no suggestion that anything is being hidden from the pupils. If a teacher does not know an answer he should say so, and should offer to find out.

1. The Parents' Role

Sex education begins long before the child comes to school, and the parents, will, in many cases, already have formed their child's attitudes to these matters, for better or worse.

Roughly we can say that the following can be expected of the pre-school child:

He should know the proper names (not the vulgar ones) of the private parts of the body.

He should know the essential anatomical differences between boys and girls.

He should know that babies come from their mother's belly, through a special opening between the legs.

To a child sex organs are to do only with excretion. In teaching the child excretory cleanliness the parent should avoid giving the child impressions that will influence unfavourably his attitudes to sex.

Young children have no sense of modesty, and this should not be forced on a child too soon. It will come by itself as the child develops.

Like teachers, parents must always try to answer their children's questions honestly, though in sufficient detail only to satisfy their immediate curiosity.

2. At Primary School

It is important that a child should have learnt the basic facts of reproduction before the onset of puberty. The so-called "latent" period, between the years of about seven to eleven, is the ideal time for this. At this time children are not so stirred, or unduly excited, by such matters, as they are after puberty. After puberty much damage, which sex education seeks to avoid, will already have been done.

Reproduction is easily included in biology or nature study at the primary school. The development of the chick in the egg, the development of tadpoles, pollination of flowers, the mating of animals, all lead up to the point where a simple account of the essentials of human sexual intercourse can be introduced.

There should also be some mention of the changes that occur at puberty, so that children are not taken by surprise when the signs of adulthood come on.

3. At the Secondary School

Most of the knowledge of human reproduction can be introduced either as part of the biology course, or in the physiology and hygiene lessons, although it must always be remembered that far more is implied in human reproduction than the bare biological details. Family life is the keynote.

Opportunities may also arise in other subjects, and all teachers should take the opportunity of answering questions when they occur.

The important point about sex education in the secondary school is the development of healthy and mature *attitudes* towards sex. This can only come about if the teachers themselves have healthy and mature attitudes.

4. Curriculum Co-operation in Sex Education

Biology. The anatomy and physiology of the human and animal reproductive systems should be studied as is any other system, such as the digestive system, the excretory system, etc. The study of inheritance comes in this subject too.

Physiology and Hygiene. In schools where human physiology is studied as a separate subject from animal physiology, obviously the place for the study of human reproduction is here. Included in hygiene should be some account of venereal disease and the way it is spread.

Physical education. The teacher whose subject is physical fitness often has an opportunity for frank discussions with pupils who are disturbed by sex problems. In the case of boys the subject of masturbation should be dealt with; in the case of girls a healthy attitude towards menstruation can be inculcated by the form or games mistress.

Domestic science. Here the emphasis is on the home, family life and parental responsibility.

Scripture. The Bible has many references to sexual matters, e.g. circumcision, conception, virginity, concubines, etc. Teachers should be prepared to answer questions about such words.

Debates and discussions on such topics as boy-girl relationships, women's place in the home, etc.

5. Youth Clubs

Youth leaders should endeavour to influence the young persons in their charge so that they have decent and agreeable attitudes towards sex and the opposite sex. Discussions can be arranged, and opportunities for questions given. In some cases it may be necessary for the youth leader to give special guidance and advice to individuals who have distorted ideas. Youth leaders should always be available for private talks.

The School Hygiene Committee

From the foregoing it can be seen that School Hygiene covers a wide field. So many aspects of school life are involved that it is highly desirable that there should be some sort of steering or co-ordinating committee.

The Principal is the one finally responsible, but his work will be easier and the whole system of School Hygiene will run smoother if he has a committee to help him, to ensure that no aspect is overlooked, and to ensure the co-operation of all whose help is needed.

The function of such a committee should include some of the following:

1. Time-table arrangement to allow sufficient time for Hygiene and Physiology lessons, and for outside demonstrations and excursions.
2. Making all the staff in the school aware of their responsibility as continuous practical examples of healthy living.
3. Reminding teachers that all subjects should include and emphasize references to health and health ideals wherever possible, for example, in English composition essays on health ideals can be written.
4. Obtaining co-operation from parents in the matter of cleanliness, attending health examinations, home psychological environment, etc.
5. Arranging routine health inspection of the pupils.
6. Obtaining treatment for defects found.
7. Arranging special education for those unfit for ordinary classroom life.

Such a committee should include several teachers who will be responsible for curriculum co-operation; the teacher responsible for physical education must be a member; where there is a school doctor or a school nurse they will naturally be valuable members; the local Inspector of Schools would also be a member in order to obtain assistance from the Central Authority; and the parents themselves must be represented, preferably by delegates from the Parents-Teachers Association, to ensure the co-operation from parents that is so essential to success.

APPENDIX TO CHAPTER ELEVEN

Experiments in Human Physiology

Before doing these experiments, teachers must consider carefully whether the pupils have reached a stage in their scientific education where these experiments will mean anything to them. For example, a chemical test can mean very little to a pupil who has not done chemistry.

1. The Cell Structure of the Body

A microscope is necessary to demonstrate this.

(a) *Blood cells.* Clean the end of a finger with spirits. Sterilize a thick needle in a spirit flame. Stab the finger and press out a drop of blood. Place on a clean slide and quickly smear it out thinly by using the edge of a second slide. Dry quickly in the air. Examine under the high power. The red cells appear a yellowish colour, the white cells (there are far fewer of them) as darker dots.

(b) Using a spoon scrape the inside of the cheek, and spread on a clean slide. Dry quickly, or examine wet. Scale-like *epithelial cells*, often containing a nucleus, can be seen.

The ordinary skin can also be scraped. These cells are leaf-like in shape.

(c) If prepared slides can be obtained from the medical school of a university, the most useful ones are: a section through the skin, a section through the small intestine, and a section of liver. The latter shows typical cells and nuclei.

2. The Systems

(a) *General anatomy.* Get a pupil to strip to the waist, or lower, and draw with chalk the outlines of the heart, trachea, and bronchi, the liver, stomach, intestines, kidney (at the back). Copy these from a chart or picture in a textbook.

(b) *The bones.* Get each pupil to feel the bony parts of his body identifying each with that on a chart or diagram. If a real skeleton is available so much the better. It should still be used only to compare with the living body, however.

(c) *The muscles.* From a chart the pupils can identify some of the chief muscles of their own body. They can feel how each muscle is attached at one end to a bone, and, usually, at the other to a string-like tendon attached to another bone which the muscle moves. The pupils can also feel how a muscle contracts, gets fatter and harder, when it is worked—this can be conveniently felt in the muscles of the front of the upper arm (biceps), or the jaw muscles at the side of the face.

A model of the upper arm and elbow joint can easily be made of strips of wood, with pieces of rubber (strips of old inner-tube) as the muscles as illustrated in Figure 37.

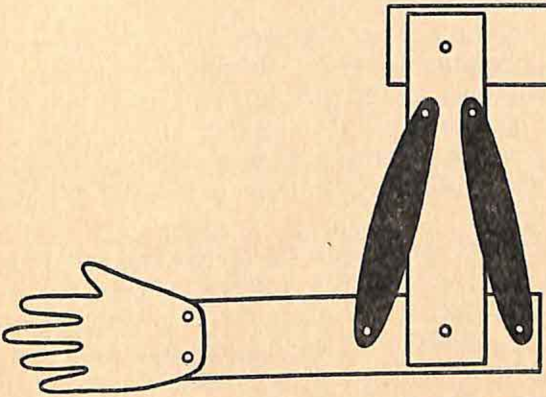

FIG. 37. A MODEL THE CHILDREN CAN MAKE OUT OF WOOD AND RUBBER

(d) *The respiratory system.* Pupils in pairs can look at each other's throats, noting the tonsils and pharynx.

They can feel their own larynx and trachea.

With a piece of string or tape round the chest they can measure the increase in circumference when breathing in (chest expansion) on themselves.

In pairs they can strip and, putting an ear to the chest, hear the breath sounds in the lungs.

Tapping the chest, especially in the collar bones, produces a hollow sound, showing that there is air inside.

The rate of breathing, the number of breaths per minute, can be counted. When the muscles are doing work more oxygen must be provided. This happens automatically and can be demonstrated to the class by sending a child to run hard round the playground. Another child can be asked to try to stop breathing for a while until his oxygen is used up. In both cases the increased rate of breathing can then be noted.

Conversely it can be shown that if the body has too much oxygen, more than it needs, then the rate of breathing automatically slows. Ask a few pupils to pant hard for a minute or two, without leaving their seats, thereby giving their blood extra oxygen. Then count the breathing rate when they resume natural breathing.

That expired air contains *carbon dioxide* can be demonstrated by getting a pupil to blow through a test-tube of clear lime water (a filtered solution of calcium hydroxide). A white precipitate of calcium carbonate forms.

The presence of water vapour (humidity) in expired air can be demonstrated by blowing on to a cold mirror or window-glass.

To illustrate the mechanism of respiration take a large glass syringe, as used by doctors (without the needle). Hold so that the nozzle is uppermost. Let each pupil pump the plunger up and down so that air is drawn in and out of the cylinder (it can be felt against the chin). The plunger moves up and down in a similar way to the diaphragm. (A bicycle pump does not act this way because it draws the air in at the sides of the plunger which acts as a one-way valve.)

(e) *The circulatory system*

The heart. The heart-beat can usually be felt in the space between the fifth and sixth ribs, about a hand's breadth to the left of centre. Pupils, working in pairs, can hear the heart beating by applying the ear to the chest at this point.

Obtain a complete sheep- or ox-heart from your butcher. Explain to the slaughterman that he must leave the blood vessels (and lungs too if you like) attached to the heart. Cut open the heart in front of the class. Thread blue string to illustrate the course of the venous blood, and red string to illustrate the course of the arterial blood. Demonstrate also the difference in thickness between the walls of the left ventricle and right ventricle.

The pulse. The action of the heart in pumping blood out through the arteries can be felt. The most convenient spot for this is the pulse at the wrist at the base of the thumb. If a second person now puts his fingers round the upper arm, squeezing tightly to compress the artery (as in the First-Aid pressure point), the pulse at the wrist will no longer be felt.

The veins. Many veins lie just beneath the skin and are easily seen in the forearm. If a band is tied round the upper arm (not so tight as to stop the artery) the veins stand out even more, and the arm feels full and hot. This shows that blood is being forced in from the arteries but the band is compressing the veins so that it cannot get out.

The valves in the veins can be demonstrated as in the classical experiment used by Harvey, the discoverer of the circulation of the blood, in the seventeenth century. Press with your thumb a vein at a point nearest the subject's hand. Then with your finger run along the vein towards the body, until the next tributary comes in. This is to empty the vein. The vein between the first point and the tributary remains empty; the blood cannot flow back into it because of the valves.

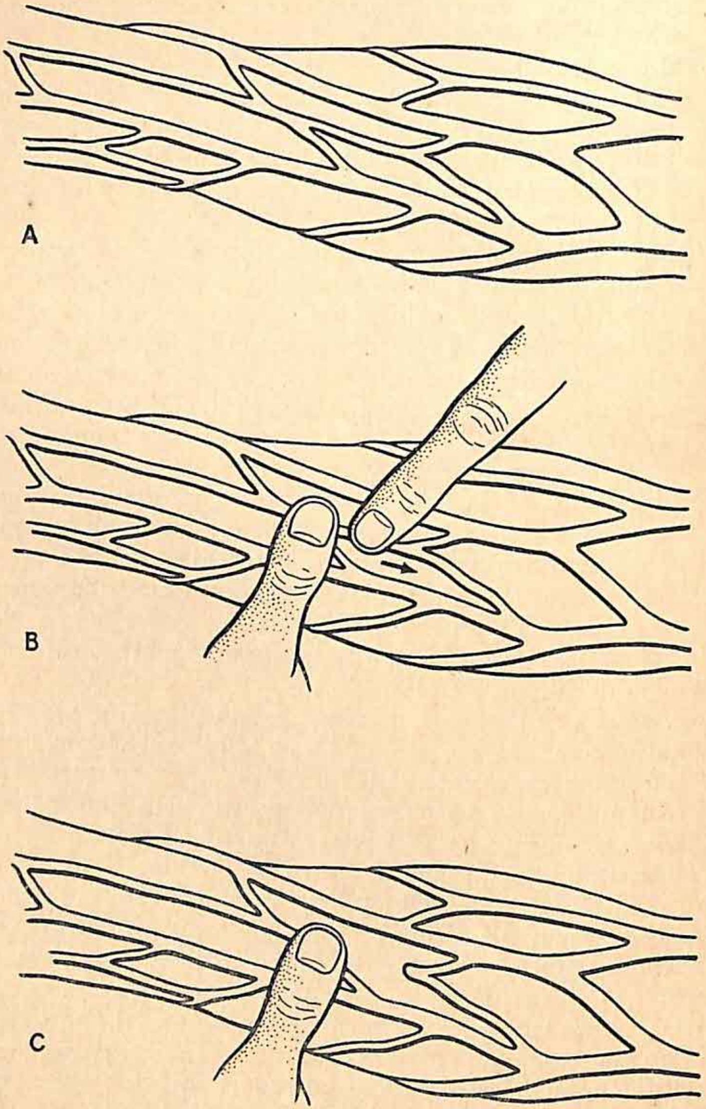

FIG. 38. HARVEY'S CLASSICAL EXPERIMENT TO DEMONSTRATE THE DIRECTION OF THE FLOW OF THE BLOOD IN VEINS

Notice that the veins in the back of the hand always become empty when the hand is raised above the level of the heart, because there is no pressure in the veins.

Blood. The cellular nature of the blood has already been demonstrated.

Go to the slaughterhouse (early in the morning) and ask the superintendent to let you have some fresh blood, collected from an animal actually being killed. Pour some quickly into a plain flask, and allow to stand. Pour another lot into a flask which contains a small spoonful of potassium oxalate. Shake to mix. Allow the plain flask to stand; the blood clots, and gradually separates out leaving clear yellow serum. Examine some of this clot under the microscope: note blood cells and string-like clot fibre cells. The clotted blood is compared with the oxalated blood. Oxalated blood will not clot. If a centrifuge is available, centrifuge some oxalated blood. The blood *cells* go to the bottom, leaving clear yellow *plasma*, i.e. serum with the clotting principle still in solution.

Small blood vessels can often be seen on the whites of the eyes. These are arterioles.

Capillaries can sometimes be seen in the thin tissue at the base of the nail (if it has not been pushed back). Put a drop of oil on this (clove oil, immersion oil, or liquid paraffin), and examine it with a strong dissecting lens or low power of the microscope. The capillaries look like fine pink hairs.

The *heart rate* per minute can be counted. It can be demonstrated that the heart has to pump the blood round faster when oxygen is required, e.g. (*a*) after exercise and (*b*) after holding the breath.

(f) *The digestive system*

Saliva has the power of digesting starch, turning it into sugar. Make some starch jelly from plain potato starch (mix the powder with cold water first then boil). Let each child place about a spoonful of this in a clean test-tube. Each child then spits sufficient saliva into the tube to cover the jelly. The tube is kept warm under the shirt, or in a water-bath at blood heat, for ten minutes or so, by which time sugar should have formed. This can be tested for by (*a*) taste, or (*b*) chemically (see later). Test the untreated jelly as a comparison.

Pepsin, the digestive ferment of the stomach, can be bought as a powder. Make a strong solution, and fill several test-tubes. Place a small piece of cooked white of egg in one, and a small piece of cooked meat in another. Put both under the shirt or in a warm-water bath at blood heat for ten minutes or more. Note the time taken to dissolve various types of protein. As a comparison make another set and keep it cool.

The *anatomy* of the gut can best be illustrated in the rabbit, which is very similar to that of a human being. Note the difference in appearance between the stomach, small intestine, large intestine, and lower colon.

Show how the gut lies in folds of membrane, in which the blood vessels run.

Obtain a few inches of sheep's small intestine. Cut it open for the pupils to see and feel the folds and velvety surface due to the hair-like villi.

Chemical tests for foodstuffs

(i) *Sugar*. Obtain a bottle of Benedict's solution from the chemist or drug store. Place about an inch in a test-tube. Add a little of a solution of honey, glucose, or fruit juice. Boil. Benedict's solution is originally clear blue, but in the presence of natural sugar it goes green, yellow or brown according to the amount of sugar present.

(ii) *Starch*. The starch solution to be tested should be very diluted. Add a drop of diluted tincture of iodine. A blue colour indicates starch.

(iii) *Protein*. Fresh colourless nitric acid is used as the reagent. If added to any solid or solution containing protein, a yellow colour is produced. Note that most starchy foods contain a little protein, but sugar does not.

Microscopic examination of foodstuffs

(i) *Milk*, spread thinly on a slide. The globules of *fat* will be seen.

(ii) *Flour*, spread thinly with a little water under a cover glass. Examine under the microscope. The granules of starch, each in its own cell, will be seen. Run in a drop of dilute iodine and notice the granules go blue or black.

(g) *The nervous system*

Reflex action. The increase of respiration rate and heart rate due to lack of oxygen has already been mentioned.

The blinking of the eye when something almost hits it, can be demonstrated, or pretend to touch a pupil's hand with something hot.

If one leg is crossed over the other it can be made to kick involuntarily if the tendon just below the kneecap is lightly tapped.

The toes can be made to bend down if the sole of the foot is tickled.

Reaction time. The time taken for a sensation to travel up to the brain and back can be demonstrated as follows. Get the pupils to stand in a circle holding hands, facing outwards. Explain that one pupil is going to squeeze the next child's hand, that the next child has to pass on the squeeze as soon as he feels it to the next child and so on all round the circle, and that you are going to time how long it will take for the squeeze to pass through them all. Use a watch with a second hand, or preferably a stop-watch.

Divide the total time by the total number of pupils. This will give the average "reaction time" per pupil.

The senses

Vision. The anatomy of the eye can be demonstrated by getting the pupils to look at each others' eyes, noting the clear cornea projecting forwards, the iris with the central hole (pupil), the white sclera.

Note that the pupil of the eye gets smaller on looking at a bright light (the window) or on going out into the sunshine.

Note also that the pupil of the eye gets smaller when looking at a near object after looking at a far one. Hold a pencil about six inches in front of the eye, while the person is looking into the distance, then get him to look at the pencil.

This also illustrates binocular (double-eyed) vision. Both eyes will be seen to turn inwards to look at the pencil.

Binocular vision can also be illustrated by getting the children to put their forefingers together about six inches in front of the eyes. Then look at something on the other side of the room. The fingers will look like a sausage suspended in mid-air (see Figure 39).

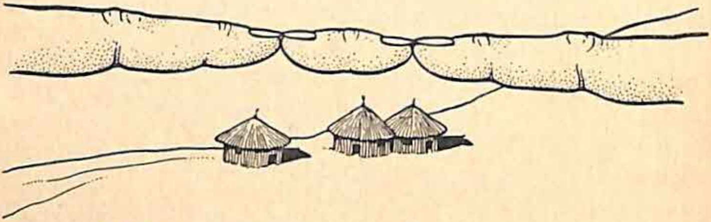

FIG. 39. A DEMONSTRATION OF BINOCULAR VISION
(See text)

Using the right eye look through a tube of paper at something the other side of the room, keeping both eyes open. Now move the left hand to the side of the tube. It will appear as though there is a hole through the hand (see Figure 40).

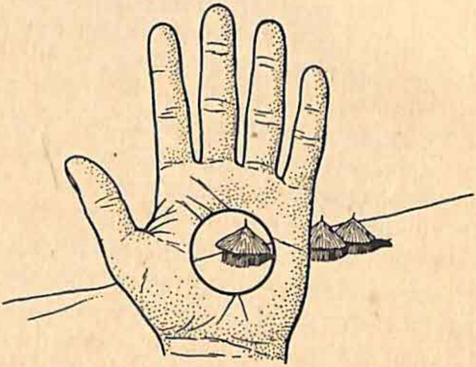

FIG. 40. ANOTHER DEMONSTRATION OF BINOCULAR VISION
(See text)

Binocular vision is necessary for judging distance. Show how it is more difficult to touch a certain spot on the desk with one eye shut.

The retina can only respond in terms of vision, no matter in what way it is stimulated. Touch the side of the eyeball and a spot appears, but on the other side because the brain has to reverse everything that occurs on the retina. This reversal is necessary because the lens of the eye turns the light rays upside-down.

Take a lens, or magnifying glass, and show how an image of the window is thrown on to a piece of paper behind the lens. Note that this image is upside down.

The fact that there is a blind spot on the retina can be demonstrated by getting the pupils to draw two dark crosses on a piece of plain paper, three inches apart. Hold the paper about a foot away from the eyes. Close one eye, say the left. With the right eye look at the left cross, moving the paper back or forward. The right cross will disappear.

The anatomy of the eye can also be demonstrated by obtaining an ox eye from the slaughterhouse. Note the attachments of the muscles. Cut it in half to show the lens, the two chambers, the iris and the cornea. Also the optic nerve running from the back.

Hearing, *taste* and *smell* need no demonstration.

That *touch* can play tricks with us can be shown by crossing the index and middle fingers. Then, with the eyes shut, place a pencil between the tips of the two crossed fingers. It will feel as though there were two pencils. Touch cells are much closer together in the fingertips than in the back. A pair of divisors, however close the points are together, will feel like two points when touched on the fingertips. If the points are touched on the person's back they feel like one point, even when actually they are as much as a quarter of an inch apart.

3. Clothing

Small pieces of different sorts of material may be tested

(*a*) By burning. Note how cotton burns differently from wool.

(*b*) Under the microscope. Note the different appearance of strands of wool, cotton, or artificial silk, when teased out from the material.

4. Germs

The presence of putrefactive bacteria in the air can be demonstrated as follows:

(*a*) Cut a potato or yam in two with a clean knife. Leave the clean-cut surface of one half exposed for some days and note the appearance and occurrence of colonies of mould or bacteria. Let one child draw his finger across the clean-cut surface of the other half, then place it in a closed tin. After a few days examine. It will be found that most of the rotting is taking place where it was touched. This shows the presence of germs on our fingers.

(*b*) Take three flasks containing dilute clear meat soup. Plug the mouth of one with cotton wool. Into another put a spoonful of Dettol. Boil all three for twenty minutes. Leave for a few days. The plain open one will go bad several days before the plugged one, showing that the cotton wool is keeping out the germs from the air. The one containing Dettol will keep longer. The antiseptic acts as a preservative, and, incidentally, makes it uneatable (because foods preserved this way may be poisonous or indigestible).

(*c*) Prepared slides of various types of germs may be obtained from a laboratory, but an oil-immersion microscope is needed in order to see them.

RECOMMENDED READING MATTER

PUPILS' REFERENCE BOOKS

Secondary School:

- *Physiology and Hygiene*, by Kirsten and Groenwoud (Juta, Cape Town).
- *Healthy Living*, by Chubb and Malan (Longmans, Cape Town).
- *Health Science for Tropical Schools*, by Daniel (Oxford University Press, London).
- *Elements of Tropical Hygiene*, by Sanderson (Longmans, Cape Town).
- *First Course in Hygiene*, by Lyster (University Tutorial Press, London).
- *General Course in Hygiene*, by Ikin and Oates.
- *Grow up and Live*, by Chesser (Penguin, London).
- *Health and the Home*, by Lamont (Arnold, Leeds).
- *The Miracle of the Human Body*, by Roberts (Odhams, London).
- *Your Body and How it Works*, by Elwell (Cambridge University Press).
- *Sex, Its Meaning and Purpose*, by Sargent ("Teach Yourself Series", English University Press).
- *Tropical Hygiene for Schools*, by Evans (Lutterworth Press, London).
- *Junior Mothercraft Manual*, British Red Cross (Educational Publications, London).
- *Practical First Aid Manual*, British Red Cross (Educational Publications, London).
- *First Aid Illustrated*, by Butt (Longmans, London).
- *Hygiene Notes*, by Francis (Sheldon Press, London).
- *First Aid in Illness*, by Todd (Longmans, London).
- *Kingsway Book of Healthy Living*, by Rowland (Evans, London).

Primary School:

- *Look After Yourself*, by Pumphrey (Arnold, Leeds).
- *Look After Others*, by Pumphrey (Arnold, Leeds).
- *How the Body Works*, by Michaelis (Longmans, London).
- *Personal Hygiene for Girls*, by Seton (Evans, London).

K

Healthy and Happy, by Bibby (Macmillan, London).

Health can be Fun, by Leaf (Warne, London).

A Guide to Health Education in Tropical Primary Schools, by Barrett (Longmans, London).

How Life is Handed On (Sex Education), by Cyril Bibby (Nelson, London).

The Truth about the Stork (Elementary Physiology and Sex Education), by Griffith, (Lewis, London).

Life and Growth, by Legge and Rigby (Faber and Faber, London).

HYGIENE TEACHERS' REFERENCE BOOKS

School Hygiene:

Hygiene and Health Education for Training Colleges, by Davies (Longmans, London).

Text Book of Healthy Living, by Diehl (McGraw Hill, New York).

Personal and Community Hygiene Applied, by Williams and Wetherill (Saunders, Philadelphia).

Health Teaching in Schools, by Grout (Saunders, Philadelphia).

School Health Education, by Oberteuffer (Harper, New York).

Modern School Hygiene, by Gamlin (Nisbet, London).

Health Education, by Bibby (Heinemann, London).

Health and Physical Education in Small Schools, by Broady and French (University of Nebraska Press).

Health Principles and Practice, by Langton and Anderson (Mosby, St. Louis, U.S.A.).

Health Facts for College Students, by Etheredge (Saunders, Philadelphia).

School Health and Health Education, by Turner (Oxford, London).

School Health Services, by Wilson (National Education Association of the United States, Washington).

Objectives of the Physical Education Lesson, by Randall and Waine (Bell and Sons, London).

General Texts:

- *Everyman in Health and Sickness*, by Roberts (Dent, London).
- *Health and Disease in the Tropics*, by Wilcocks (Oxford, London).
- *Tropical Medicine for Nurses*, by Adams and Macgraith (Blackwell, Oxford).
- *Handbook for Dispensary Attendants and Medical Field Unit Attendants*, by McLetchie, O'Neill and Eyre (Oxford University Press, London).
- *Tropical Dispensary Handbook*, by Chesterman (Lutterworth Press, London).
- *A Manual of Practical Sanitation*, by Kirk (Tindall and Cox).
- *Public Health in South Africa*, by Cluver (Central News Agency, Johannesburg).

Mental Health:

- *Mental Hygiene for Classroom Teachers*, by Bernard (McGraw-Hill, New York).
- *Your Mind and Mine*, by Cattell (Harrap, London).

Sex Education:

- *About Your Marriage*, by Ludlow (Longmans, London).
- *Sex Education*, by Bibby (Macmillan, London).
- *Physiology of Sex*, by Walker (Penguin, London).
- *The Art of Marriage*, by Macaulay (Delisle, London).

Nutrition:

- *Why Our Children Die*, by Onabamiro (Methuen, London).
- *Health and Diet of the African Child*, by Charity Fiawoo (Longmans, London).
- *Teaching Better Nutrition* (Food and Agricultural Organization of the United Nations, Rome).
- *School Feeding* (Food and Agricultural Organization of the United Nations, Rome).
- *About Yonr Food*, by Plummer (Longmans, London).
- *Food and Health*, by Onabamiro (Penguin, London).
- *The Food We Grow*, by Treleaven (University of London Press).
- *Guide to Health for Adults*, by Fletcher (South African Institute for Race Relations, Johannesburg).

Pamphlets, etc.

A large range of cheap pamphlets on School Health are obtainable from H.M. Stationery Office, Kingsway, London, S.E.1.

Pamphlets and posters on various diseases, nutrition, child welfare, etc., are usually obtainable from Government Departments of Health in your own country. A wide range of pamphlets and posters is also available from: The Red Cross Society, P.O. Box 3266, Johannesburg; Central Council for Health Education, Tavistock House, London, W.C.1.

Pamphlets on health published by the World Health Organization, U.N.E.S.C.O. and F.A.O., are obtainable from Van Schaik's Bookstore, Pretoria, or from H.M. Stationery Office, Kingsway, London, or direct from the organization concerned. Payment may be made by using U.N.E.S.C.O. vouchers.

Magazines on Health

The Health Magazine, South African Health Society, P.O. Lovedale, C.P., South Africa, quarterly, 2s. per year.

Health Horizon, published at Tavistock House, London, W.C.1. S. African agents: Central News Agency; quarterly, 10s. per year.

Better Health, 72 Fleet Street, London, E.C.4; monthly, 4s. 6d. per year.

Family Doctor, published by the British Medical Association, B.M.A. House, Tavistock Square, London, W.C.1; monthly, 14s. per year. S. African agents: Central News Agency.

Health Education Journal, published by the Central Council for Health Education, Tavistock House, Tavistock Square, London, W.C.1; quarterly, 10s. per year.

The Junior Red Cross, published by the South African Red Cross Society, P.O. Box 3266, Johannesburg; monthly, 2s. per year.

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